

NICODEMUS SLOUGH/C-19 PROJECT

CONCEPTUAL DESIGN REPORT

JULY 1986



SOUTH FLORIDA WATER MANAGEMENT DISTRICT
P.O. BOX V
WEST PALM BEACH, FLORIDA 33402

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6. Construction of a levee along the west side of State Road 78 from Culvert 5 north to LD-3 and raising SR 78 to elevation 24' NGVD in this reach to protect the road during high water conditions. The levee may be deleted if the Florida DOT will allow the proposed, raised SR 78 to act as the detention area levee in this reach.

7. Acquisition of fee title to a small parcel of land in the northeast corner of the basin (near LD-3 and SR 78), including relocation of persons and equipment currently on the property. This was determined to be the most cost effective way to address the flood protection problem for this parcel, which would result from implementation of the project.

8. Automation of S-47B.

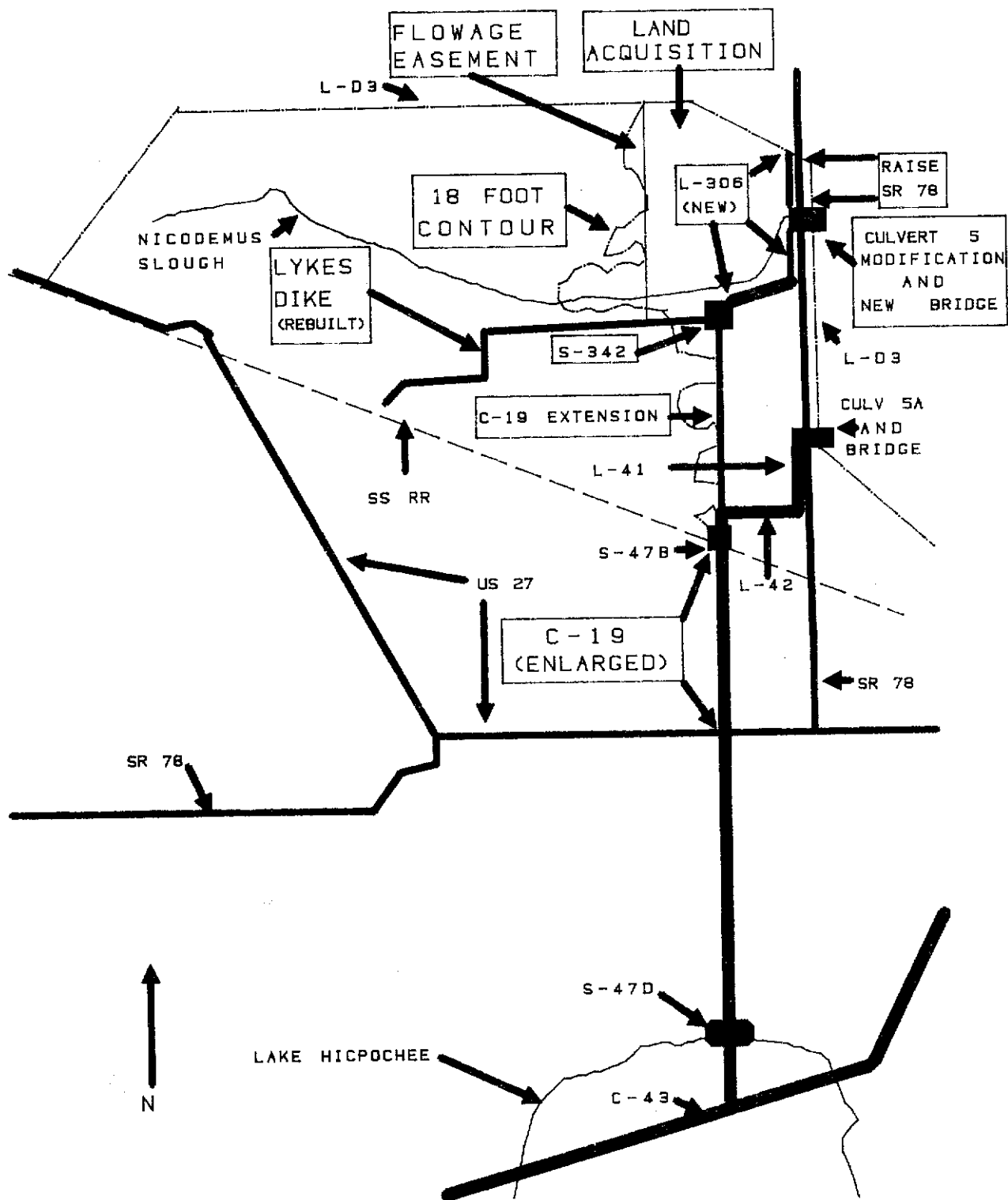
9. Additional rip-rap immediately downstream of S-47D.

10. Replacement of the crossing over the L-41 borrow canal at Potato Farm Road with two 72" diameter culverts at invert elevation 7.0' NGVD.

11. Replacement of the SR 78 bridge at Culvert 5.

12. Install fencing along the west, south and east boundaries of the fee title acquisition area to control access to the detention area.

13. Modification of Culvert 5 to add slide gates to the remaining two culverts. This is needed to hold higher water levels in the detention area during the wet season to create additional marsh habitat.



NICODEMUS SLOUGH
SELECTED PLAN

SCALE 1/2" = 1 MILE
(APPROXIMATE)

II. General Background Information

A. Land Characteristics

Nicodemus Slough is located on the west shore of Lake Okeechobee in Glades County, about six miles north of Moore Haven (see Figures 1 and 2). The most recent data indicates that a large portion of Glades County is in some form of agricultural land use (see Figure 3), which occupies some 253,395 acres, or 41 percent, of the total area of the county. The major land use in the Nicodemus Slough area is agricultural (13,188 acres out of a total of 24,942 acres for the total drainage area). The soils are generally sandy with numerous muck pockets in and near the slough areas. Vegetation is predominantly scrub palmetto interspersed with native grasses. Most of the land is used as native range for beef cattle. The developed area immediately south of Nicodemus Slough consists of mostly improved pasture with some acreage used for truck crops and sugarcane. Land elevations range from 13.5' - 14.0' NGVD near the SR 78 bridge at Culvert 5, to 35' NGVD in the western portion of the drainage basin.

B. Urban development

There are 2,304 dwelling units (1980 population of 5582) located in Glades County, and nearly half of these are mobile homes. The largest concentration of dwellings in Glades County is in the Buckhead Ridge area. There is no urban development in the Nicodemus Slough area. Moore Haven is the nearest town and is located about 6 miles southeast of the area.

C. Agriculture

Approximately 78,000 head of beef cattle are raised in Glades County. The county produces approximately 8 percent of the total beef production in the state. Glades County also has five dairies with 3,500 head of cattle. The deepest organic soils in the county are located south and east of Moore Haven where lands have been converted from truck farming to sugarcane. The same general agriculture trends apply to the Nicodemus Slough area with beef cattle production being the primary activity. Small amounts of land near State Road (SR) 78 are used for truck crops and sugarcane. Indications are that the present land uses will continue in the future with the primary use being pasture for beef cattle.

D. Transportation

The only Federal highway in the project area is U.S. 27 which helps form part of the south and west drainage boundary, as does the Seaboard Coast Line Railroad (see Figure 2). The only State road in the area is SR 78 which parallels the LD-3 section of the Herbert Hoover Dike along the eastern border of the area.

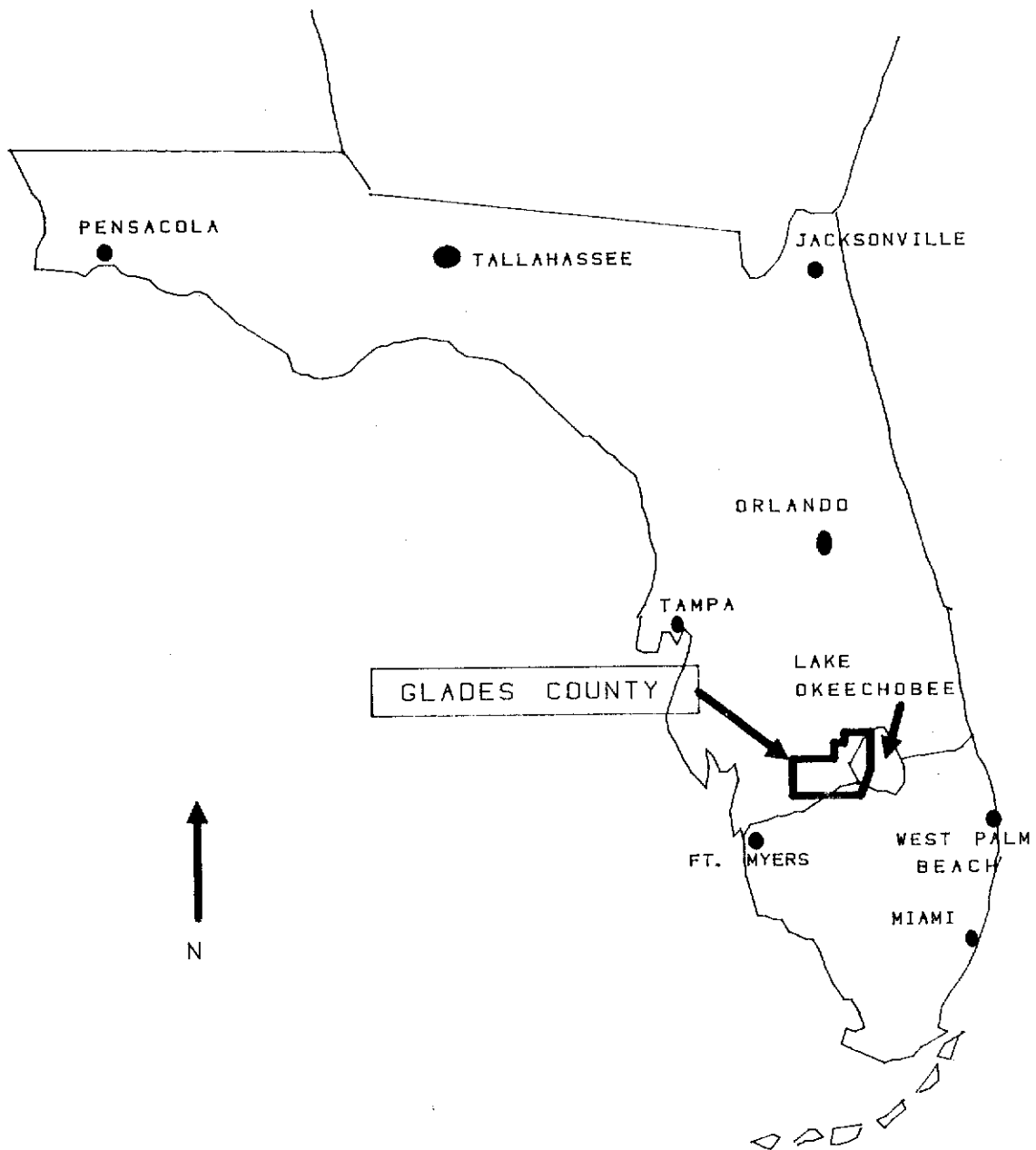


FIGURE 1
GENERAL LOCATION MAP

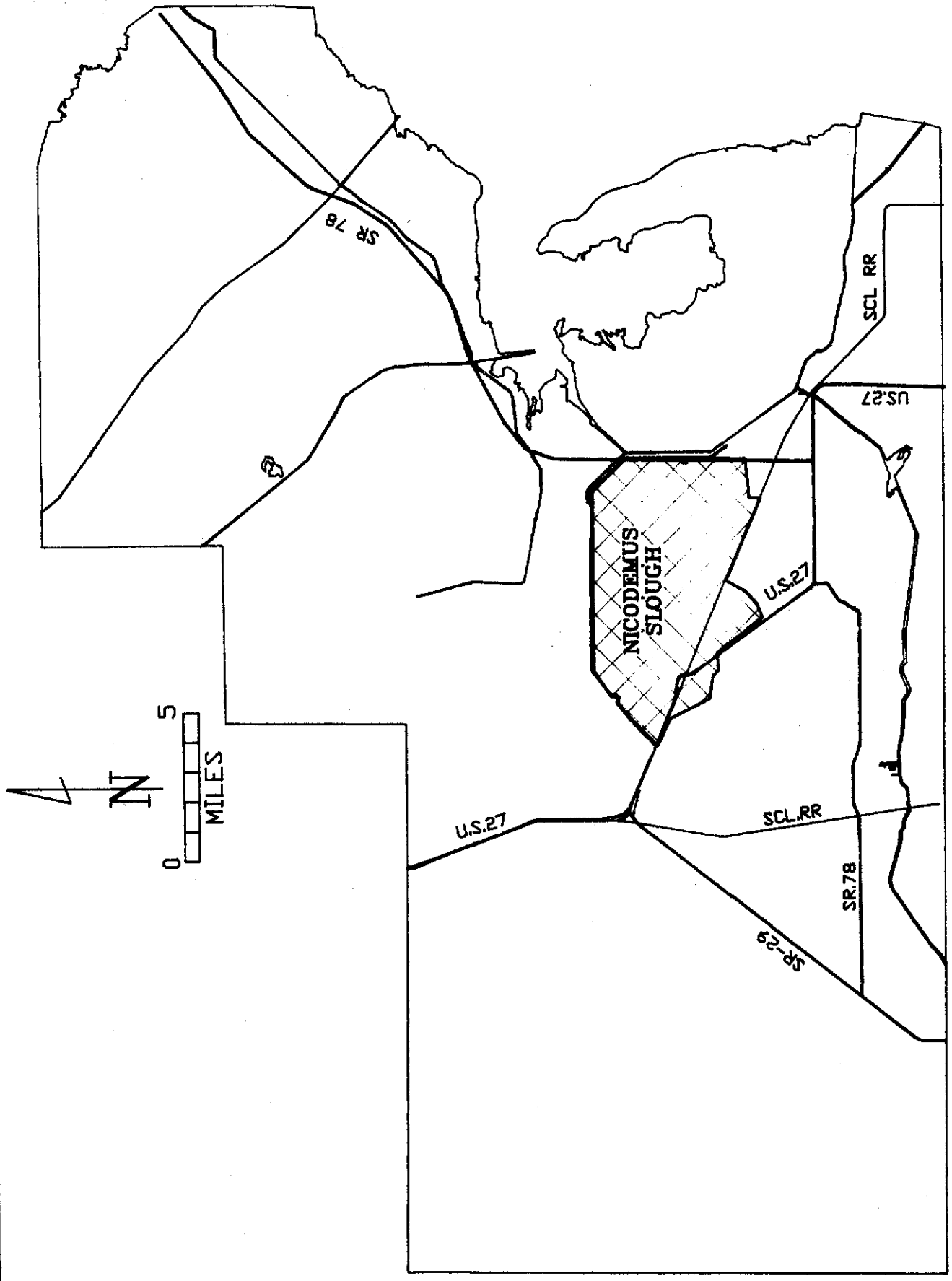


FIG.2 GLADES COUNTY BASE MAP

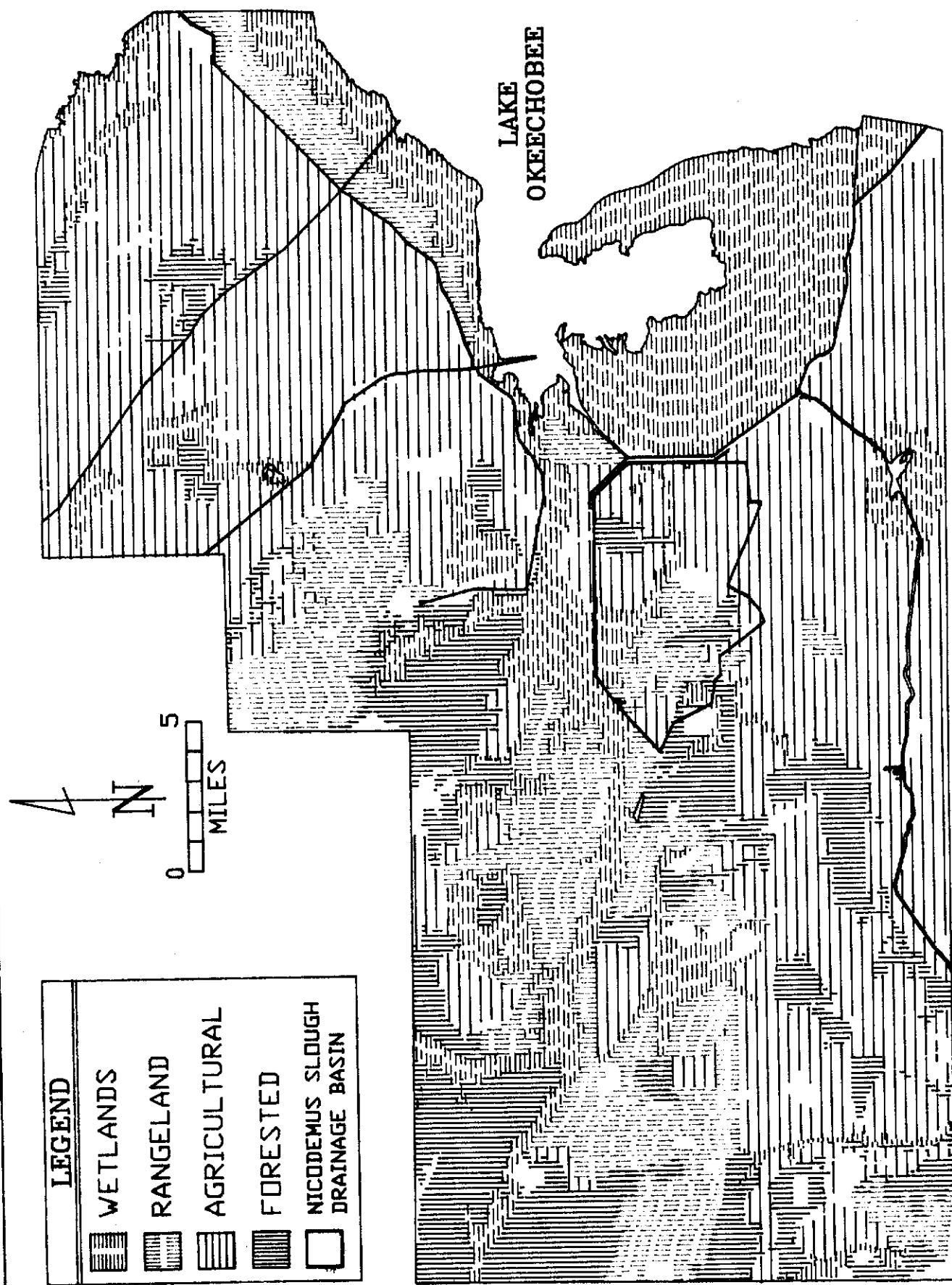


FIG.3 GLADES COUNTY GENERALIZED LAND USE MAP

E. Hydrology

The Nicodemus Slough drainage area totals about 24,942 acres. Under the current Lake Okeechobee regulation schedule (15.5'-17.5' NGVD), the area normally drains to Lake Okeechobee by way of six 10-foot diameter culverts (5 and 5A) through L-D3 of the Herbert Hoover Dike system, when stages in the slough are higher than the Lake stages, as shown on Figure 4. When Lake levels are abnormally high, it is necessary to drain some of the Nicodemus Slough area to the Caloosahatchee River on a secondary basis using the L-41 and L-42 borrow canals, after runoff from the area tributary to C-19 has been removed.

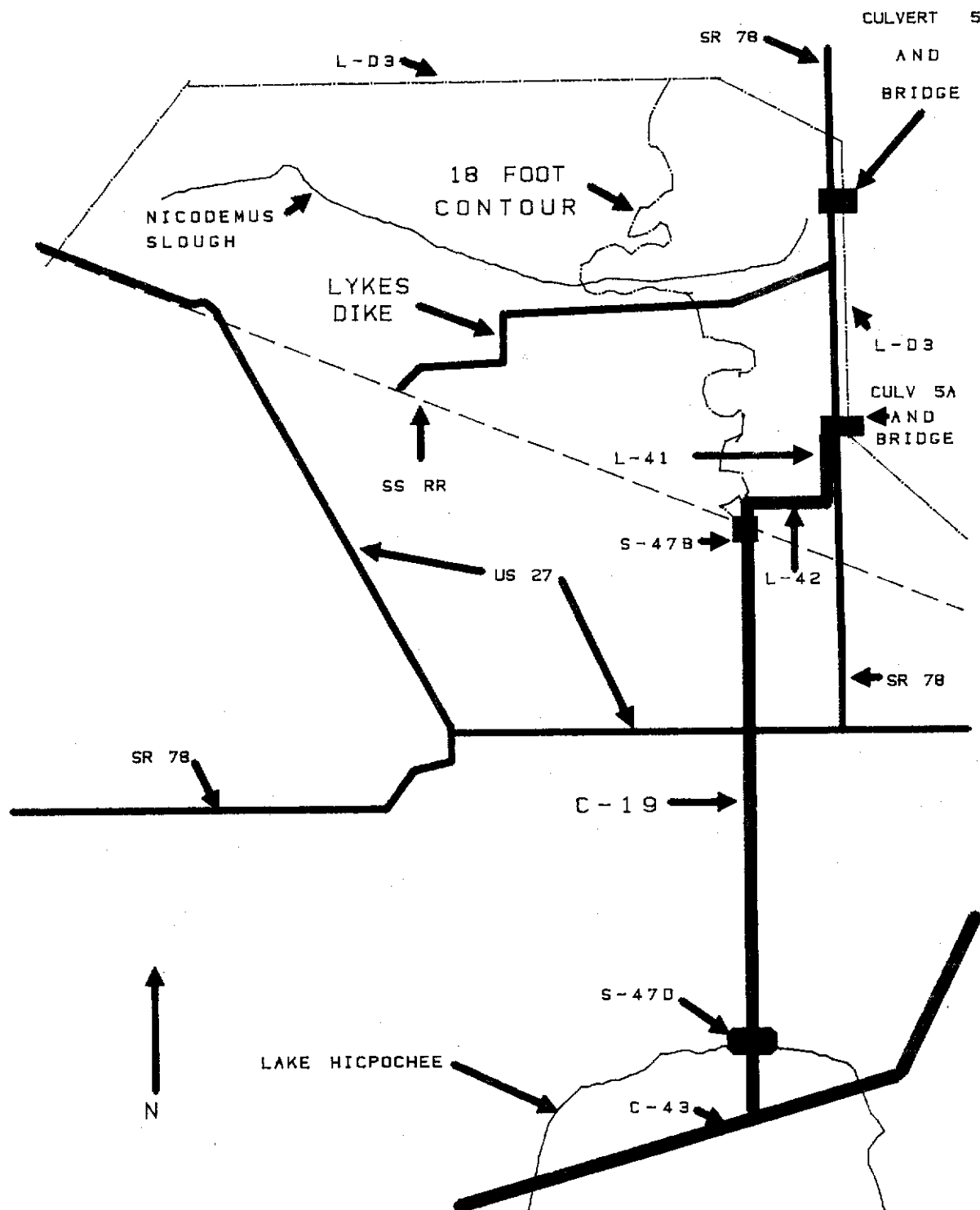


FIGURE 4
NICODEMUS SLOUGH
EXISTING FACILITIES

SCALE 1/2" = 1 MILE
(APPROXIMATE)

III. Problem Statement

A. Introduction

Existing flood control facilities in the area are shown in Figure 4. During the period when Lake Okeechobee was regulated at the 13.5 to 15.5 ft NGVD schedule, high lake stages during major floods prevented gravity drainage from Nicodemus Slough through Culverts 5 and 5A into Lake Okeechobee. This has caused long duration flooding in the lower and middle portions of the slough. These flooding conditions have been aggravated with the lake regulated at the current 15.5 to 17.5 ft NGVD schedule by causing increased and prolonged flood severity at more frequent intervals than have occurred previously. Consequently, the flood protection plan proposed herein would provide mitigative measures that would alleviate these flooding conditions.

B. Summary of previous studies/events

Improvements for the Nicodemus Slough area were added to the Central and Southern Florida Flood Control Project by the Flood Control Act of July 14, 1960. The original plan for Nicodemus Slough was presented in Senate Document No. 53 dated September 5, 1959. It provided for construction of an interceptor levee (L-51) with an adjacent borrow canal which would cross the watershed at about the 20-foot contour line (see Figure 5). This would divert runoff from about 26.3 square miles of the upper basin area northward to an outlet structure at LD-3 where it would drain to Lake Okeechobee by way of the levee borrow canal. The lower 13 square mile trapped area would be drained to Lake Okeechobee by a proposed local pumping station. Subsequent changes in public policies and responsibilities and updated design criteria have resulted in revisions to the original plan. These have been incorporated in a series of alternative plans considered for the overall area, as discussed later herein.

C. Nicodemus Slough historical stages

Approximately 21 years of stage records exist for a stage recorder located approximately 1.4 miles south of Culvert #5 in the west borrow ditch for SR 78 (see Figure 6). This borrow is directly connected to the slough. Field observations on October 24, 1985, indicated a stage difference between this recorder and the water level in the L-42 and L-41 borrow canals of 1.5-1.75 ft; therefore, it appears that there isn't a direct connection between the two systems, and that the average monthly stage at the recorder represents a mean monthly stage in Nicodemus Slough. Peak stages in the slough were probably 0.75 of a foot higher than the stage at the recorder due to head loss in the road borrow, and head loss a set of culverts just north of the recorder. Table 1 and Figures 7 and 8 present average monthly stage data for Nicodemus Slough for approximately 21 years of record, from February 1959 through August 1985. The 1976 record, which appeared to be incorrect, was not used.

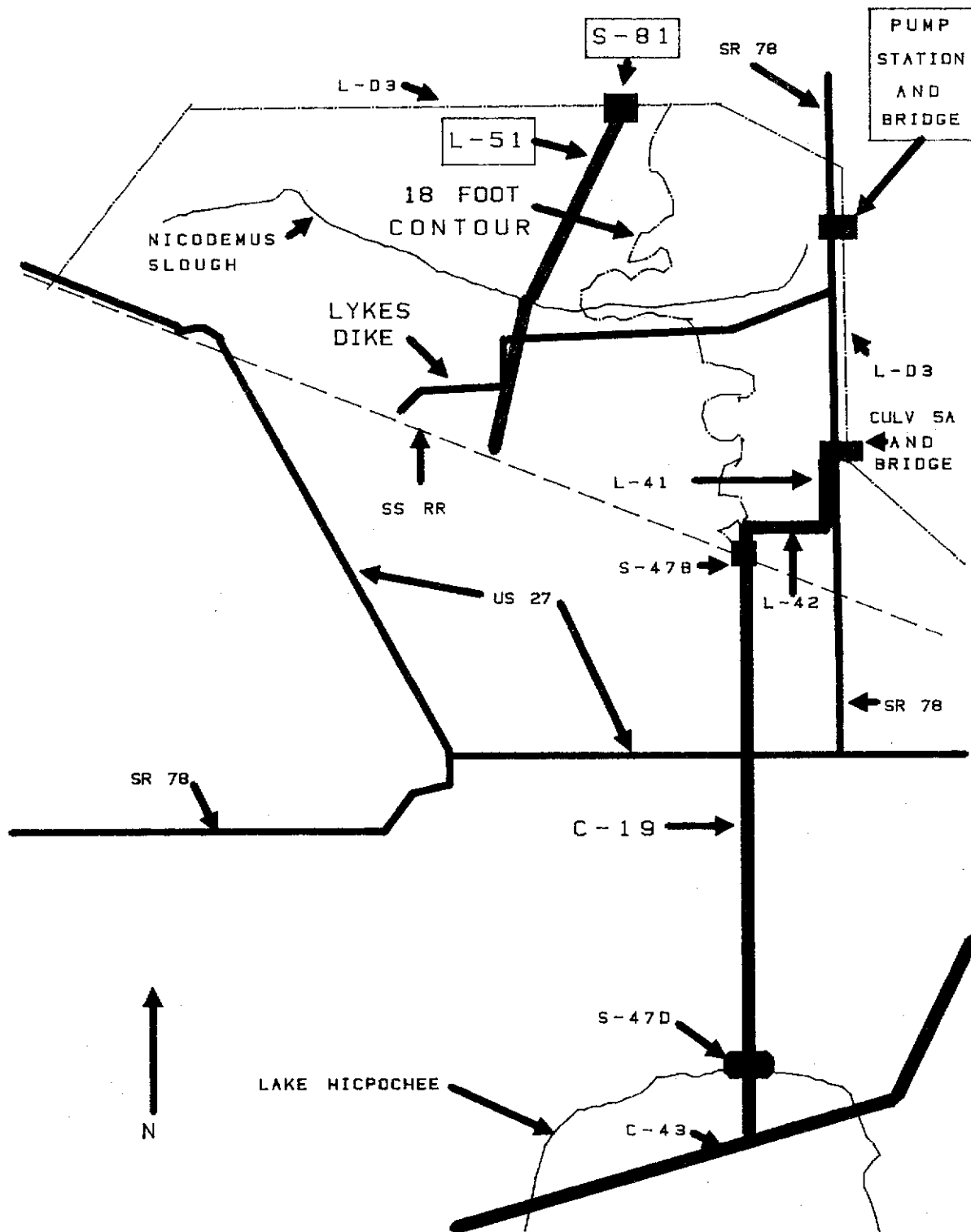


FIGURE 5
NICODEMUS SLOUGH
ORIGINALLY AUTHORIZED PLAN

SCALE 1/2" = 1 MILE
(APPROXIMATE)

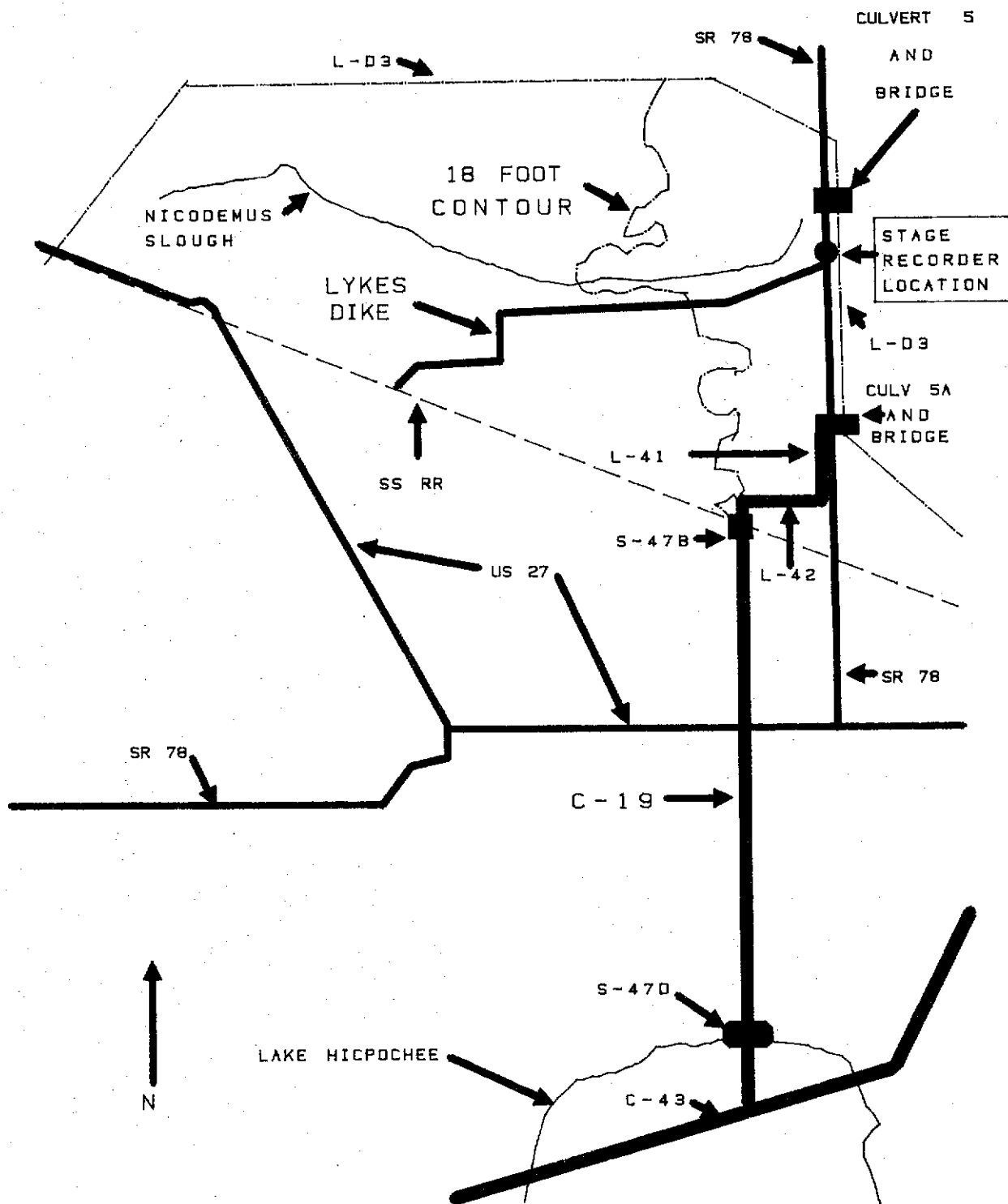


FIGURE 6
NICODEMUS SLOUGH
STAGE RECORDER LOCATION

SCALE 1/2" = 1 MILE
(APPROXIMATE)

Table 1
Nicodemus Slough Historical Stage Data

	Avg. Maximum Monthly Stage Ft. NGVD	Avg. Minimum Monthly Stage Ft. NGVD	Diff. Feet	Avg. Mean Monthly Stage Ft. NGVD
January	14.35	13.53	0.82	13.92
February	14.32	13.50	0.82	13.89
March	14.63	13.29	1.34	13.88
April	14.25	13.32	0.93	13.69
May	14.41	13.22	1.19	13.71
June	14.69	13.25	1.44	13.85
July	14.25	13.30	0.95	13.71
August	14.40	13.39	1.01	13.80
September	14.80	13.52	1.28	14.05
October	14.73	13.33	1.40	13.92
November	14.46	13.41	1.05	13.88
December	14.50	13.45	1.05	13.94
Average	14.50	13.38	1.12	13.85

	Maximum Stage of Record Ft. msl	Year	Minimum Stage of Record Ft. msl	Year	Diff. Feet
January	15.47	1979	11.65	1962	3.82
February	15.59	1960	11.82	1962	3.77
March	17.00*	1970	11.66	1962	4.19
April	15.61	1960	12.60	1962	3.01
May	15.52	1979	12.49	1967	3.03
June	16.99	1959	12.30	1971	4.69
July	15.21	1968	12.48	1961	2.73
August	15.61	1960	12.22	1961	3.39
September	16.96	1960	12.66	1961	4.30
October	17.38	1959	11.72	1961	5.66
November	16.32	1959	11.67	1961	4.65
December	15.73	1969	11.65	1961	4.08

* Stage at Culvert 5 based on Lykes Inc. data.

FEB. 1959 THROUGH Aug. 14, 1985

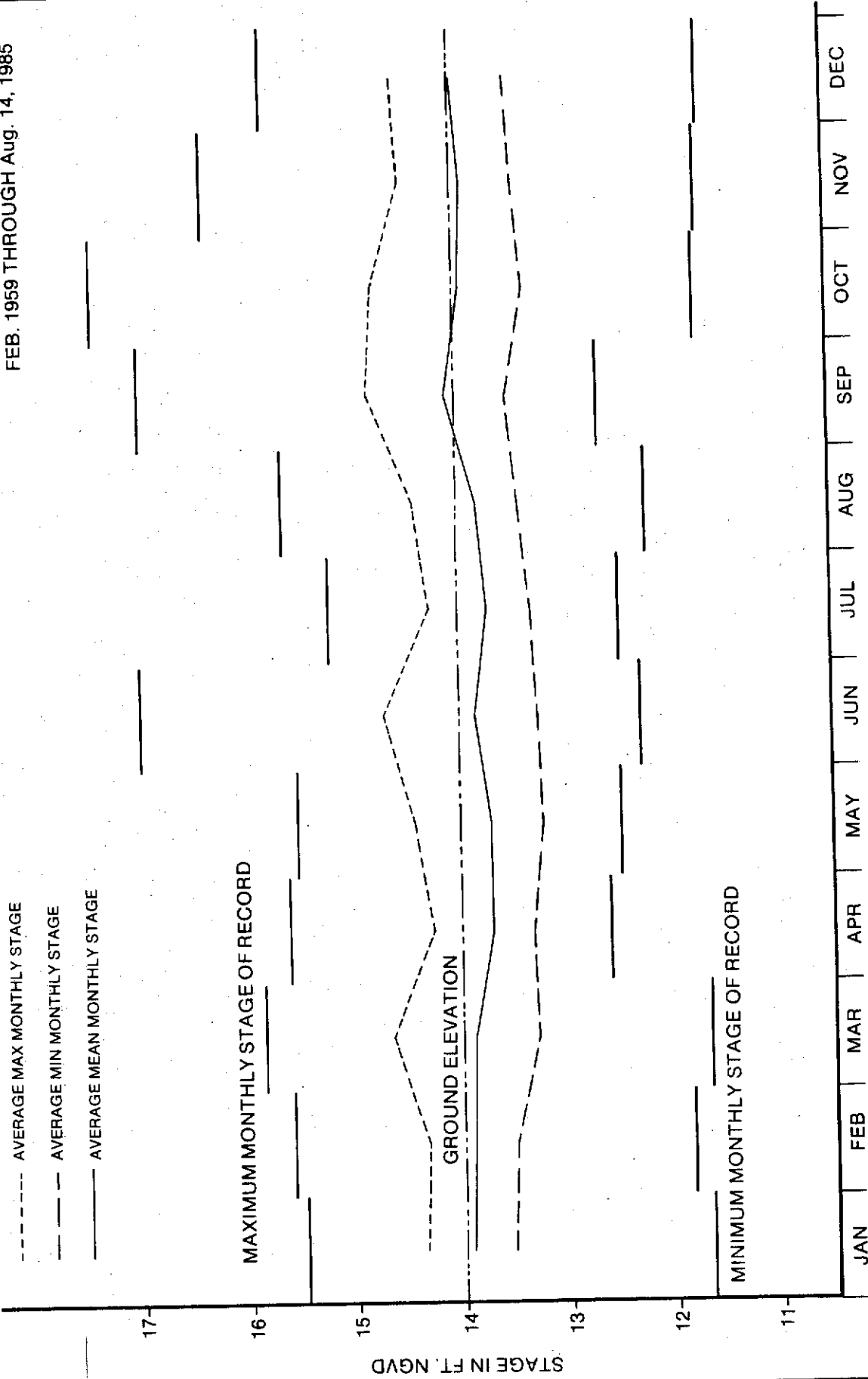


Figure 7 NICODEMUS SLOUGH AT SR 78

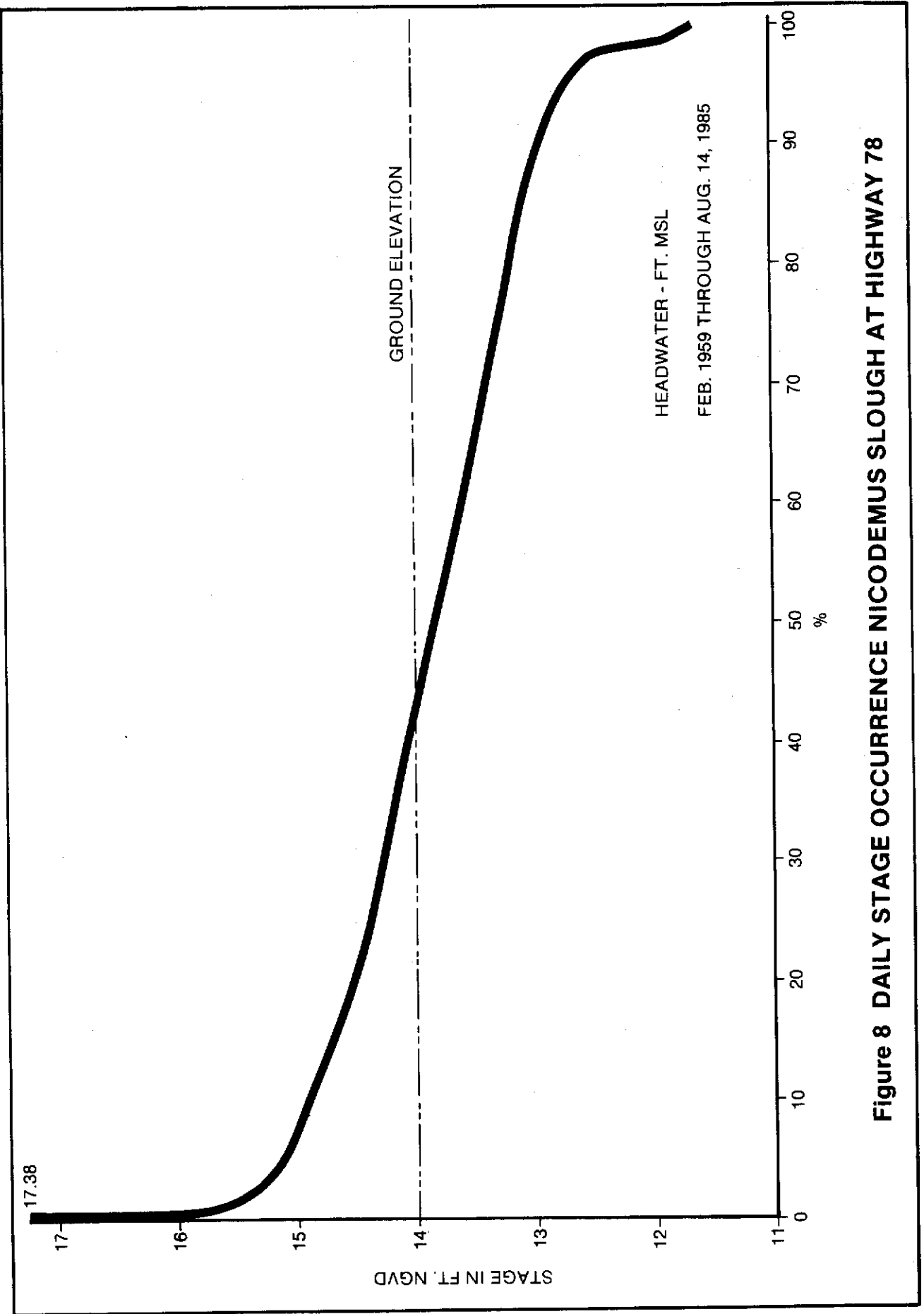


Figure 8 DAILY STAGE OCCURRENCE NICODEMUS SLOUGH AT HIGHWAY 78

The record since 1959 indicates that the peak stage in Nicodemus Slough approximated 18 ft NGVD in October 1959, thus flooding approximately 3600 acres below the 18' contour (see Figure 9). Areas with ground elevations of 13.5'-14.0' NGVD near SR 78 had approximately four feet of standing water at peak flood stage. These conditions led to the previously mentioned studies and recommendations of the COE to alleviate flooding in this area (1959 and 1960).

With a storm condition similar to the October 1959 storm, and with a Lake Okeechobee stage of 17-17.5 msl, the stage in Nicodemus Slough could reach 19 ft NGVD. This would flood approximately 5000 acres below the 19' contour, including the croplands mentioned earlier (see Figure 10). Some areas would be flooded to a five foot depth (near culvert 5). This would result in flooding an additional 1400 acres (approximately), or a 39% increase in flooded area.

Finally, from an environmental viewpoint, the data show that Nicodemus Slough has not functioned as a natural hydroperiod marsh during the period of record. This is substantiated by the vegetative characteristics of the area.

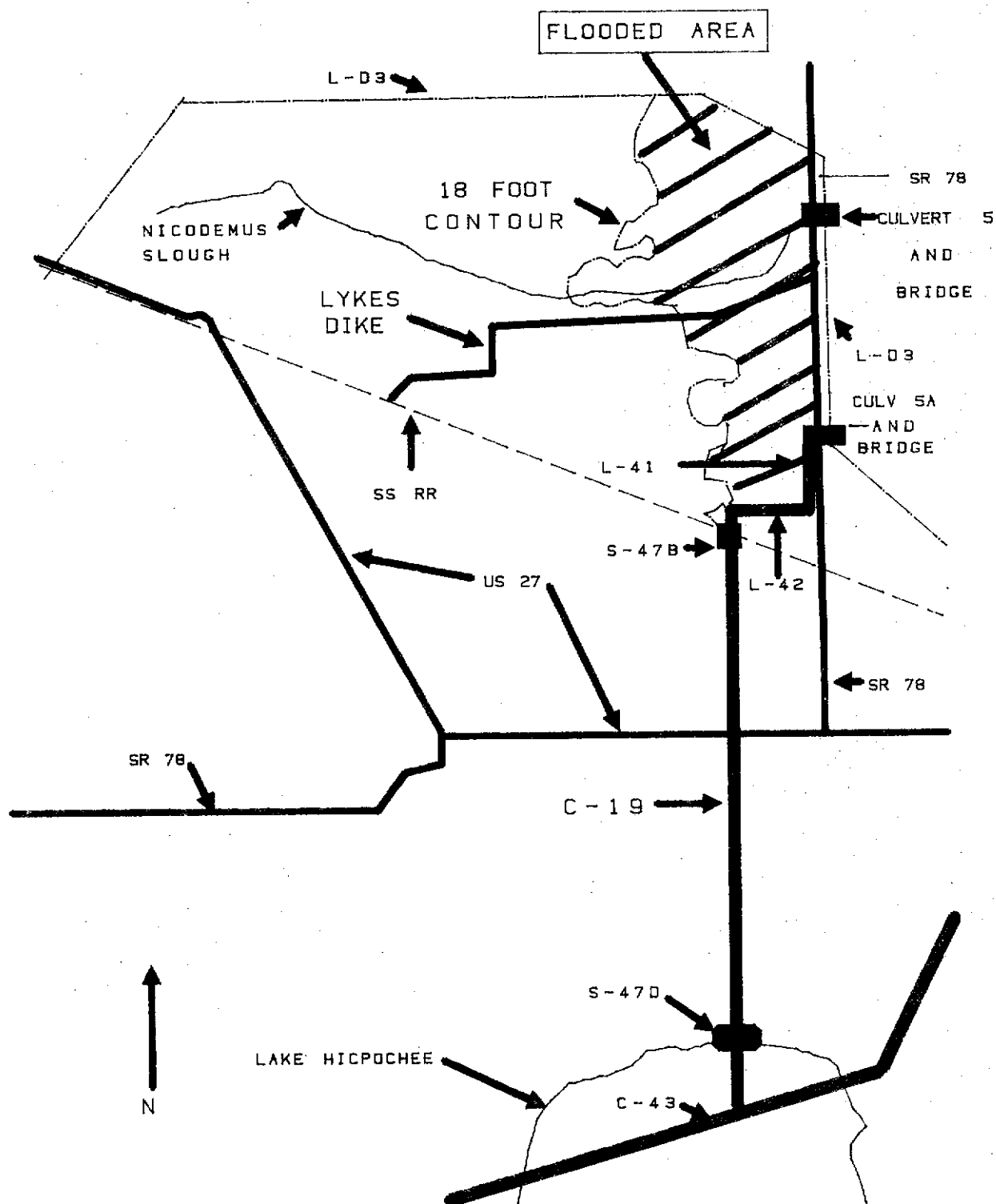


FIGURE 9
NICODEMUS SLOUGH
APPROXIMATE FLOODED AREA
OCTOBER 1959

SCALE 1/2" = 1 MILE
(APPROXIMATE)

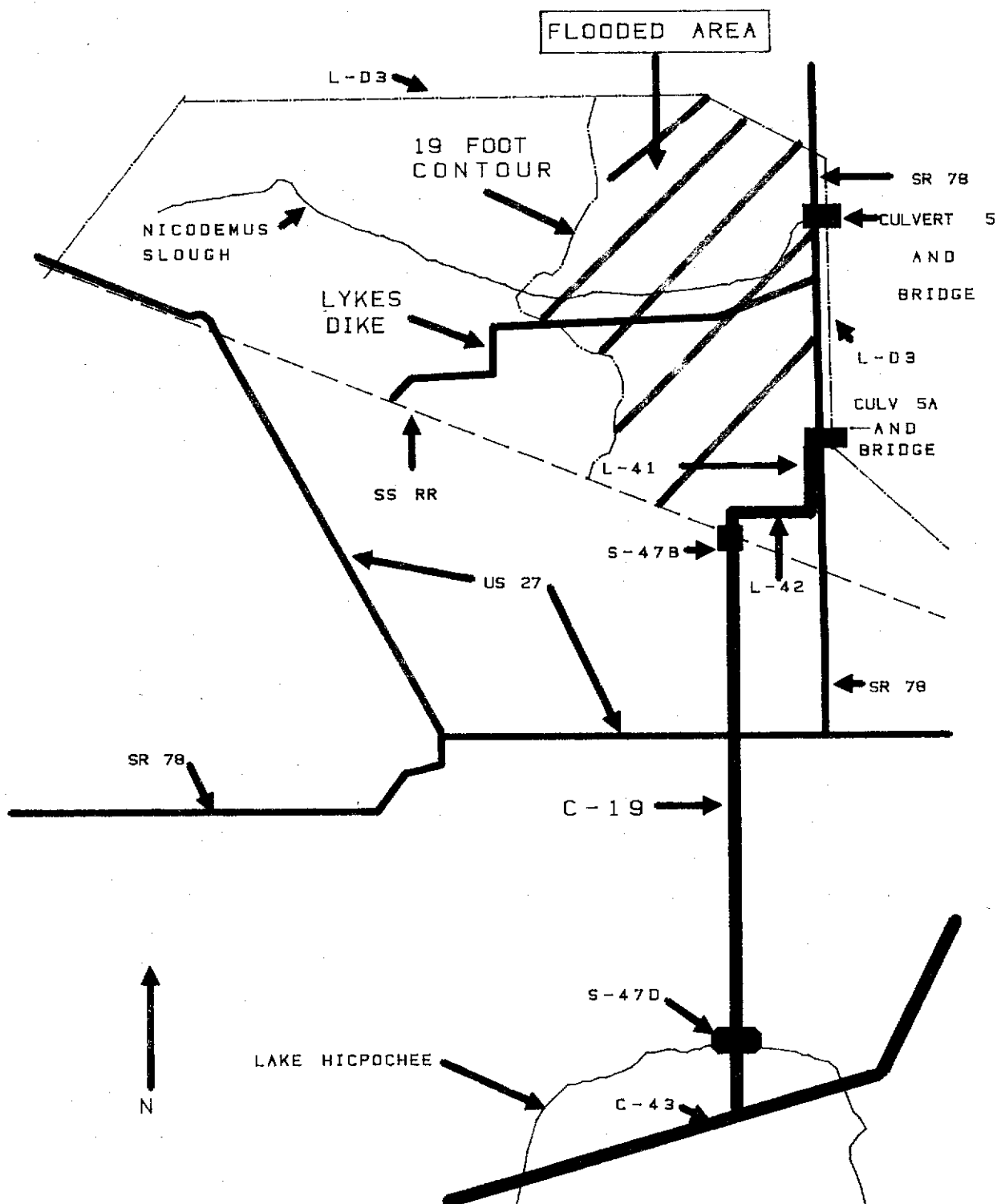


FIGURE 10
 NICODEMUS SLOUGH
 APPROXIMATE FLOODED AREA
 OCTOBER 1959 STORM CONDITIONS
 WITH CURRENT LAKE OKEECHOBEE
 REGULATION SCHEDULE

SCALE 1/2" = 1 MILE
 (APPROXIMATE)

D. Hydrology for C-19 Below S-47B (1958-1985)

Approximately 20 years of stage records for the HW of structure S-47D were analyzed. The period 1978 through November 1983 was not analyzed, however, due to data discrepancies. Table 2 and Figures 11 and 12 show average maximum, minimum and mean stages at S-47D for the period of record. The control elevation above S-47D is 12.5' NGVD.

Table 2
S-47D (Headwater) Historical Stage Data

	Avg. Maximum Monthly Stage Ft. NGVD	Avg. Minimum Monthly Stage Ft. NGVD	Diff. Feet	Avg. Mean Monthly Stage Ft. NGVD
January	12.87	11.79	1.08	12.42
February	13.00	11.83	1.17	12.48
March	12.89	11.52	1.37	12.29
April	12.89	11.26	1.63	12.12
May	12.83	11.13	1.70	12.04
June	13.19	11.15	2.04	12.25
July	12.74	11.14	1.60	11.82
August	12.84	11.26	1.58	12.01
September	12.61	11.19	1.42	11.96
October	12.72	10.86	1.86	11.81
November	13.05	11.32	1.73	12.25
December	12.75	11.54	1.21	12.24
Average	12.86	11.33	1.53	12.14

	Maximum Stage of Record Ft. NGVD	Year	Minimum Stage of Record Ft. NGVD	Year	Diff. Feet
January	14.10	1966	10.65	1971	3.45
February	14.09	1966	10.02	1972	4.07
March	13.88	1965	9.89	1962	3.99
April	14.30	1960	10.01	1970	4.29
May	14.43	1969	9.56	1962	4.87
June	15.14	1959	9.55	1971	5.59
July	13.55	1966	10.02	1970	3.53
August	13.87	1976	9.87	1958	4.00
September	13.90	1964	10.07	1965	3.83
October	13.80	1964	9.91	1966	3.89
November	13.96	1968	10.31	1963	3.65
December	14.00	1965	10.03	1968	3.97
Average	14.08		9.99		4.09

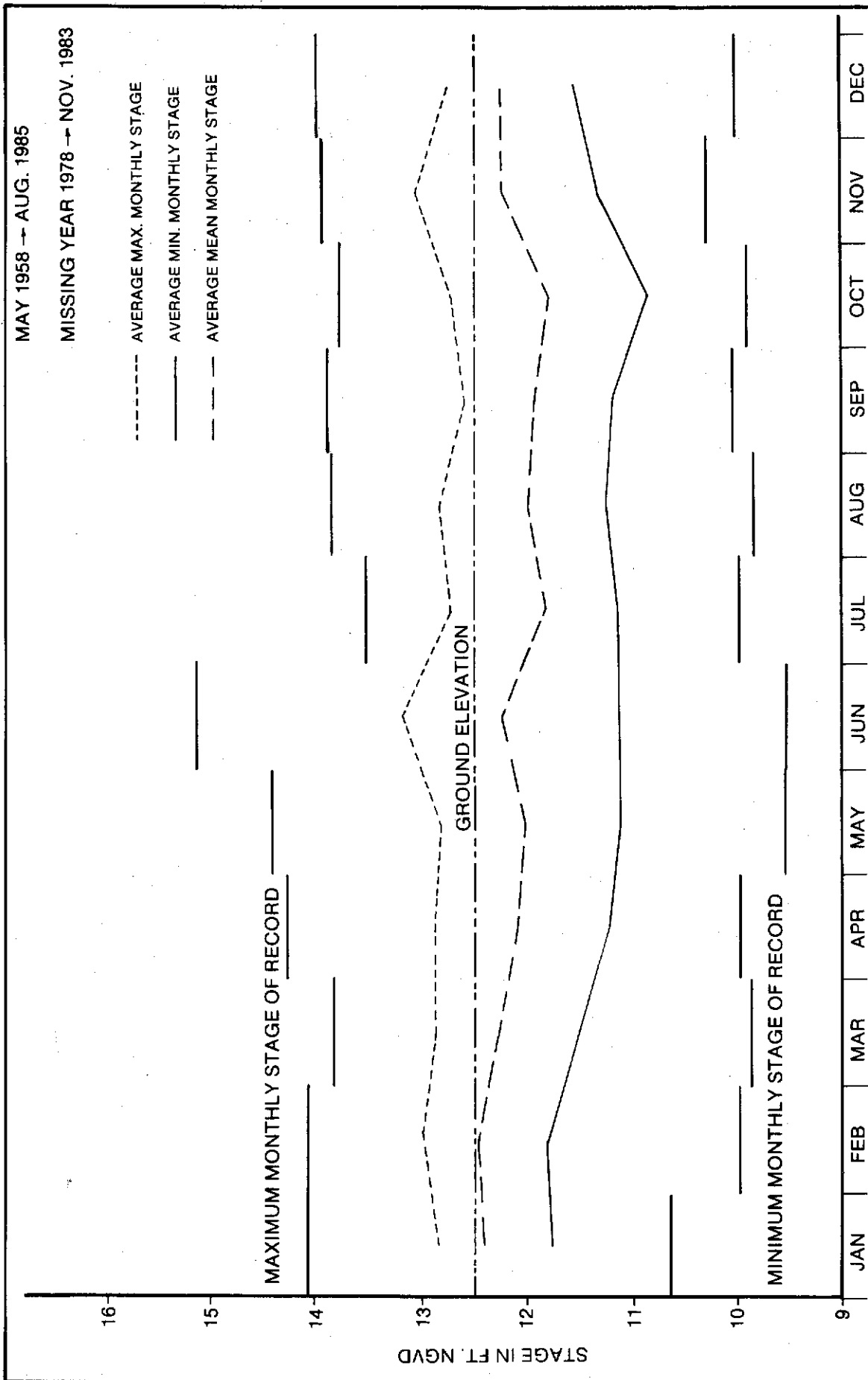


Figure 11 CANAL C-19 AT S-47D

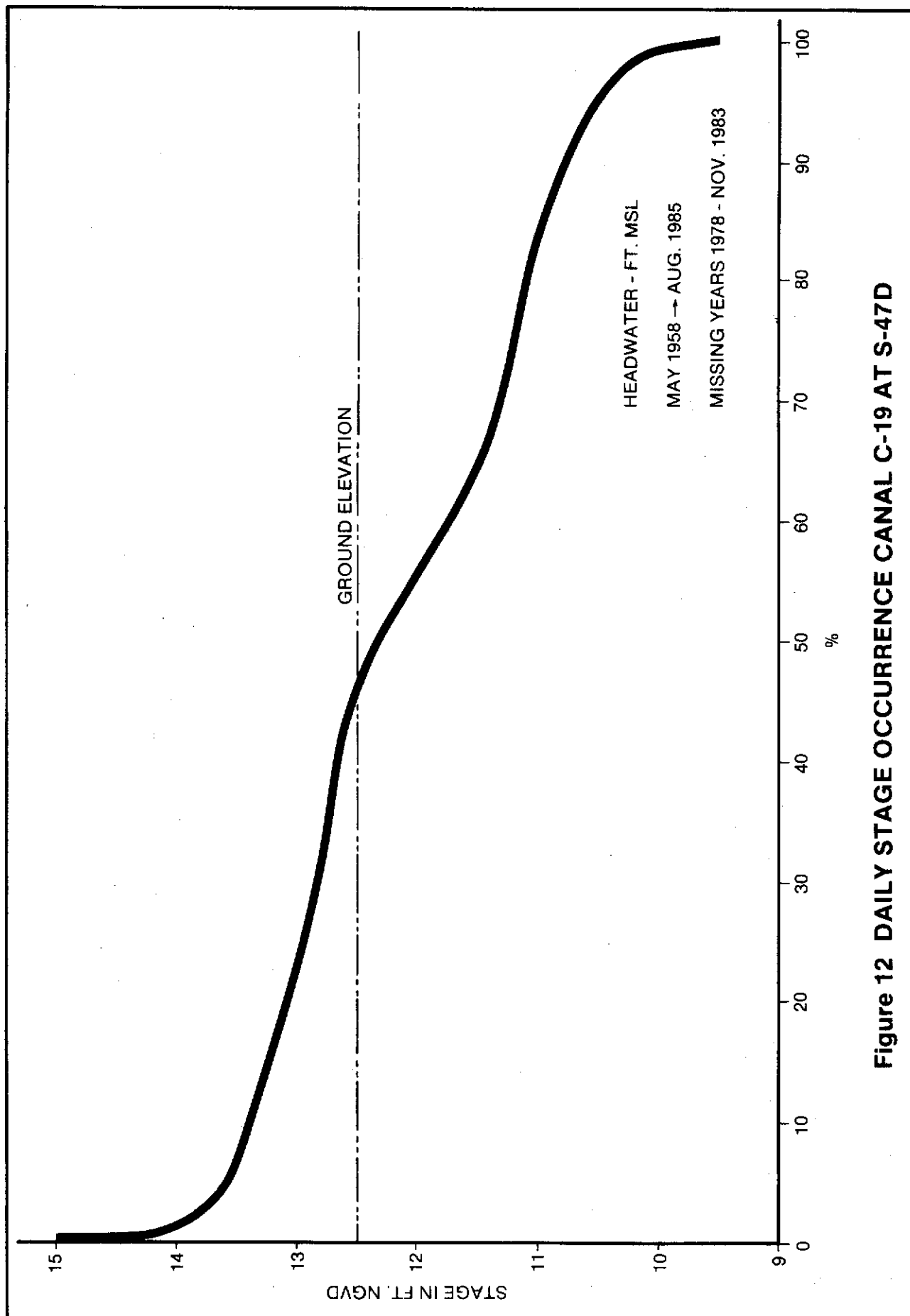


Figure 12 DAILY STAGE OCCURRENCE CANAL C-19 AT S-47D

Canal 19 is designed to pass a 50% standard project flood (SPF) storm discharge of 945 cfs at S-47D with a headwater stage of 13.76 ft NGVD, and a tailwater (TW) stage of 13.46 ft. NGVD. The design TW stage at S-47B is 14.72 ft NGVD with no inflow. When the peak storm has passed, the design calls for passing up to 400 cfs through S-47B with a stage of 13.02' NGVD at S-47D, and a stage of 14.66' NGVD at S-47B.

The original design stage at the junction with C-43 was 13.00 ft NGVD. Due to enlargement of C-43 to accept a regulatory discharge of 9000 cfs from Lake Okeechobee, the design stage of 13.0 ft NGVD has been reduced to 11.5 ft NGVD. This reduction in the tailwater stage at S-47D allows the structure to pass a greater flow at a reduced headwater stage. Additional rip-rap is recommended to be added downstream of S-47D to protect the structure due to these changes.

The present design calls for an optimum stage at 12.5 ft NGVD upstream of S-47D. Examination of historic monthly mean stages indicates that the District is operating at a lower stage so that the area upstream of S-47B is provided greater protection than has been designed into the system.

E. Pre-Project Hydrology for Area Above S-47B

The 14 years of stage records, consisting of 7 to 23 stage readings per month, were analyzed. The following table and Figure 13 presents average maximum, minimum, and mean stages upstream of S-47B.

Table 3
S-47B (Headwater) Historical Stage Data

	Avg. Maximum Monthly Stage Ft. NGVD	Avg. Minimum Monthly Stage Ft. NGVD	Feet	Avg. Mean Monthly Stage Ft. NGVD
January	13.46	12.18	1.28	12.82
February	13.43	11.98	1.45	12.77
March	13.48	11.45	2.03	12.67
April	13.15	11.51	1.64	12.47
May	13.18	11.32	1.86	12.23
June	13.44	11.56	1.88	12.59
July	13.59	12.11	1.48	12.95
August	13.71	11.96	1.75	12.90
September	13.83	12.19	1.64	13.14
October	13.57	11.94	1.63	12.78
November	13.64	12.09	1.55	12.95
December	13.56	12.06	1.50	12.99
Average	13.50	11.86	1.64	12.77

	Maximum Stage of Record ft. msl	Year	Minimum Stage of Record ft. msl	Year	Feet
January	15.70	1983	9.10	1985	6.60
February	15.64	1980	8.00	1982	7.64
March	14.24	1980	6.20	1982	9.04
April	14.80	1978	7.20	1982	7.60
May	15.30	1979	6.00	1982	9.30
June	15.10	1979	7.40	1985	7.70
July	14.70	1978	8.74	1985	5.96
August	14.64	1974	9.20	1981	5.44
September	16.16	1979	10.50	1978	5.66
October	15.20	1973	9.20	1981	6.00
November	14.80	1974	9.20	1984	5.60
December	14.84	1982	9.00	1981	5.84
Average	15.18		8.31		6.87

Stages north of S-47B in canals C-19, L-42, and L-41 can be controlled by the operation of structure S-47B. The operation manual for this structure calls for an optimum stage of 13 ft msl in the wet season, June through September, and a stage of 14 ft msl during the dry season, from October through May. Automation of S-47B would make it possible to maintain these stages, providing water is available in the drainage area or from Lake Okeechobee.

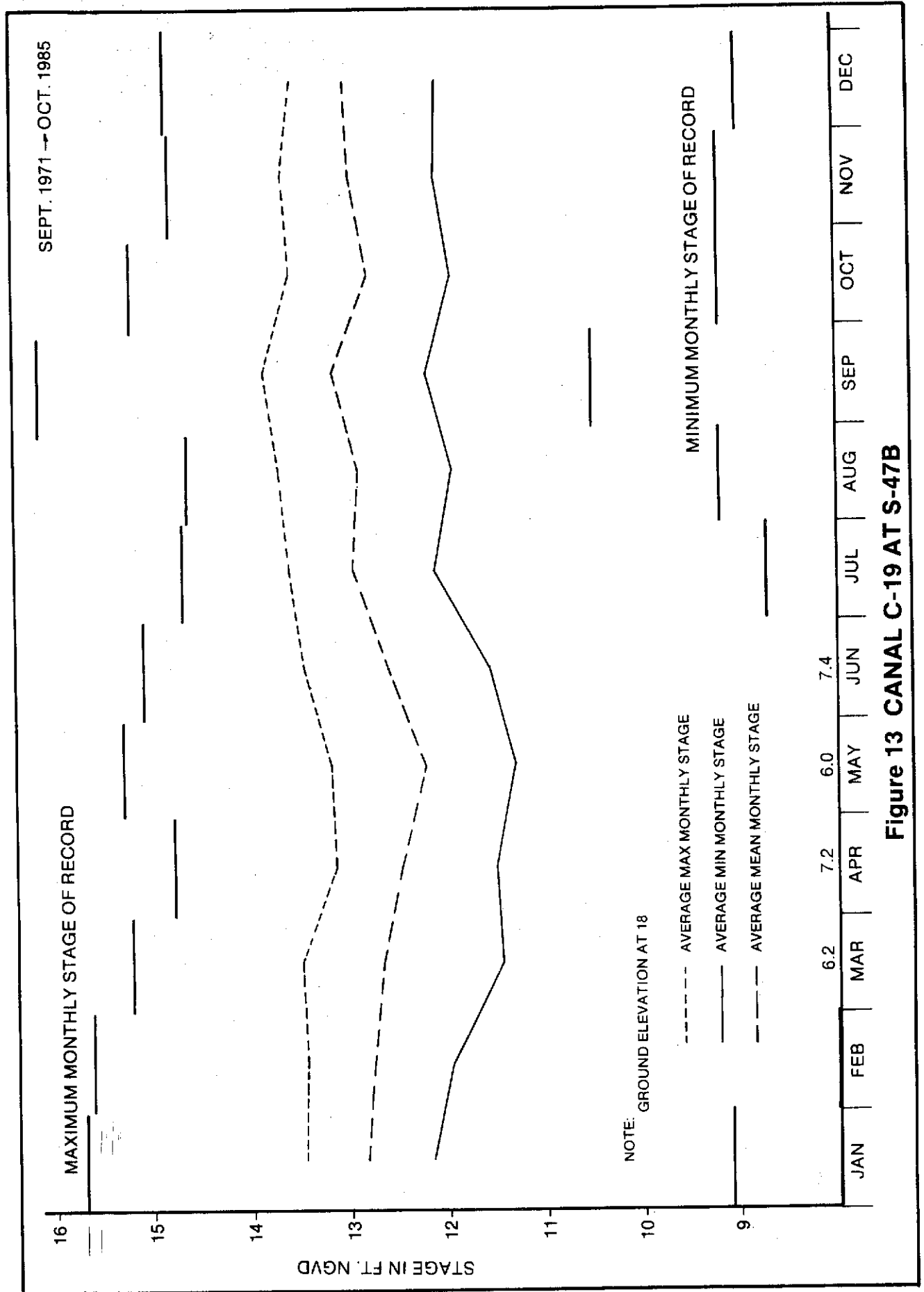


Figure 13 CANAL C-19 AT S-47B

IV. Alternative Plans Considered

A. General

An effective water management plan for the Nicodemus Slough area should provide protection against overflow from abnormally high stages and wind tides on Lake Okeechobee and the Fisheating Creek area. This would require adequate capacity for removal of rainfall excess from the interior protected area to prevent prolonged damaging flood conditions. The degree of flood protection for all structural plans considered was based on removal of 3/4 inch per day from pumped agricultural lands or the 10-year frequency flow from areas that can be drained by gravity. In addition to flood control works, primary facilities would be operated to enhance water management capability throughout the basin during normal conditions and during period of droughts. Alternative structural plans to accomplish this include consideration of primary canals and control structures, pumping stations, and an interceptor levee with associated secondary works to fully utilize the design capacity of the system. The planning process includes consideration of structural and nonstructural alternatives to achieve potential environmental objectives for the Nicodemus Slough area. Pertinent information on eight alternative plans that were considered is provided herein.

B. Plan A

This is the originally authorized plan (see Figure 14) using updated design criteria for the considered project works. A 270 cubic feet per second (cfs) project pumping station was added to serve the 13 square mile area east of L-51, and S-81 was changed to a spillway to provide more effective water control for the upper basin area. Under this plan, all flow from Nicodemus Slough would drain into Lake Okeechobee. The average annual volume of water to be pumped would be about 16,800 acre feet; average annual gravity flow would be about 17,200 acre feet. Total average annual inflow to the lake would be about 34,000 acre feet.

C. Plan B

This plan (Figure 15) would use an 800 cfs pumping station to serve the entire 39.3 square mile drainage area. The pump would discharge directly into Lake Okeechobee and there would be no appurtenant project works in the middle or upper basin areas. Average annual pumping would be about 34,000 acre feet.

D. Plan C

This plan (Figure 16) is similar to Plan A except the lowland area east of L-51 would drain to the Caloosahatchee River by gravity instead of being pumped into Lake Okeechobee. The 10-year design discharge from this lowlands area is 370 cfs. Enlargement of C-19, L-41 and L-42 borrow canals, and an extension to the L-41 borrow canal would be required.

E. Plan D

This plan (Figure 17) would provide gravity drainage for the entire Nicodemus Slough area (1,090 cfs from 39.3 square mile area) to the Caloosahatchee River. As in Plan B, it would eliminate the need for L-51 and S-81. A greater degree of enlargement would be required for C-19, L-41, and L-42 borrow canals, and the extension of the L-

41 borrow canal. In addition, both control structures S-47B and S-47D, would be enlarged.

F. Plan E

This plan (Figure 18) would consist of purchasing flowage easements up to the +20 foot contour in the area west of L-D3, raising SR 78 approximately 4-1/2 feet to elevation 23.0 ft msl for a distance of about 2.84 miles, and construction of two new highway bridges on SR 78 at culverts 5 and 5A.

G. Plan F

This plan (Figure 19) would include both structural and non-structural features. An east-west levee would protect the developed area in the southern part of the slough from the northern undeveloped area. This plan was proposed by the Florida Department of Environmental Regulation (DER), and would provide 10 year flood protection to the developed area using gravity drainage to the Caloosahatchee River. This would be accomplished by improvement to, and extension of, the existing C-19, L-41 and L-42 canal system. The unprotected area would drain to the lake when stages in the slough were higher than lake stages. A fixed-crest weir at elevation 18 would be located on the west side of culvert 5 to provide an impounded wetlands environment for the purpose of filtering runoff prior to entering Lake Okeechobee. The plan would also consider raising about 6,000 feet of SR 78.

H. Plan G

This would be a compromise plan (Figure 20) similar to Plan F, except that it would not include the fixed-crest weir because of the excessive required length needed to pass flows. Accordingly, this alternate does not consider use of an impoundment. In addition, at the east terminus of the east-west levee, an additional segment of levee would extend northward to L-D3, thus protecting the road from flooding. This would be less costly than raising the road. This plan also considers adding three slide gates to the west side of culvert 5. During the first couple of hours of flooding, these would be closed in order to divert nutrient laden runoff from entering the Lake. Afterwards, these gates would be opened to provide the lake with most of the runoff quantity.

I. Plan H

This plan (Figure 21) is a modification of Plan G and was presented to the District Governing Board at its February 1984 monthly meeting. It was developed using the guideline that drainage in the lower portion of the Nicodemus Slough drainage basin would only be provided with the same degree of flood protection (ten-year protection for gravity systems) as was provided prior to the implementation of the revised Lake Okeechobee regulation schedule. Components of the plan include the following:

1. An east-west dike (designated "Lykes Dike") which would separate the lower nine square miles currently in agricultural production, from the remainder of the basin.
2. Acquisition (using Save Our Rivers funds) of fee title to the 18' NGVD contour (approximately 1,750 acres) north of the Lykes Dike and east of an old fenceline.

3. Acquisition of flowage easements on 250 acres north of the Lykes Dike, west of the fence line, and below the 18' NGVD contour line.

4. Acquisition of flowage easements on 1,600 acres south of the Lykes Dike and below the 18' NGVD contour.

5. Construction of C-19 extension from C-19 "bend" north to the Lykes Dike, and enlargement of C-19 to provide 10-year flood protection to the area south of Lykes Dike.

6. Construction of an outlet structure at the junction of C-19 extension and the Lykes Dike to provide the capability to remove excess water from the area north of Lykes Dike during high water conditions.

7. Construction of a levee along the west side of State Road 78 from the Lykes Dike north to LD-3 to protect the road during high water conditions.

8. Construction of a levee and pump station to protect a small parcel of land in the northeast corner of the basin (near LD-3 and SR 78), or fee title acquisition, whichever approach is more feasible.

9. Replacement of the SR 78 bridge at Culvert 5.

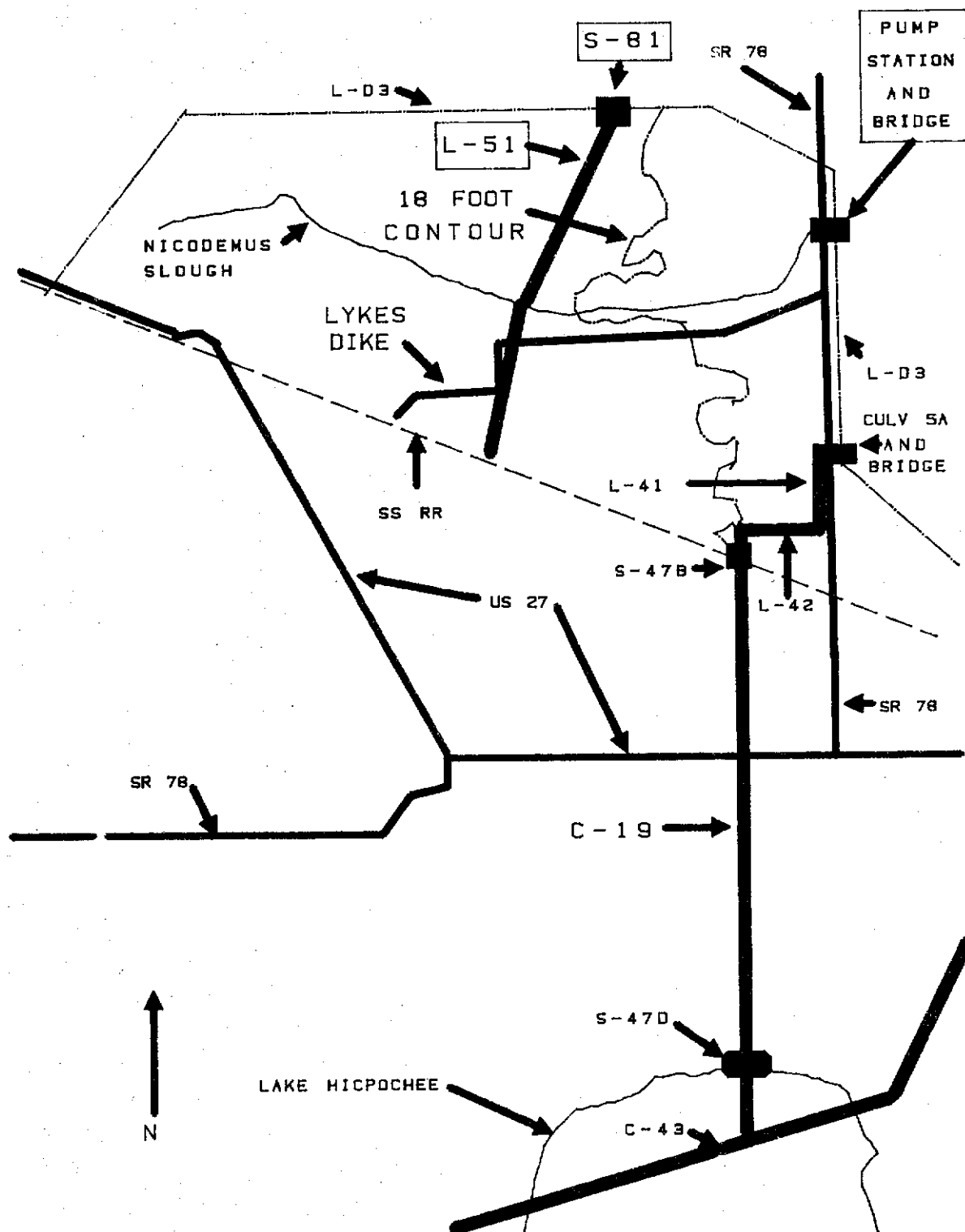


FIGURE 14
NICODEMUS SLOUGH
PLAN A

SCALE 1/2" = 1 MILE
(APPROXIMATE)

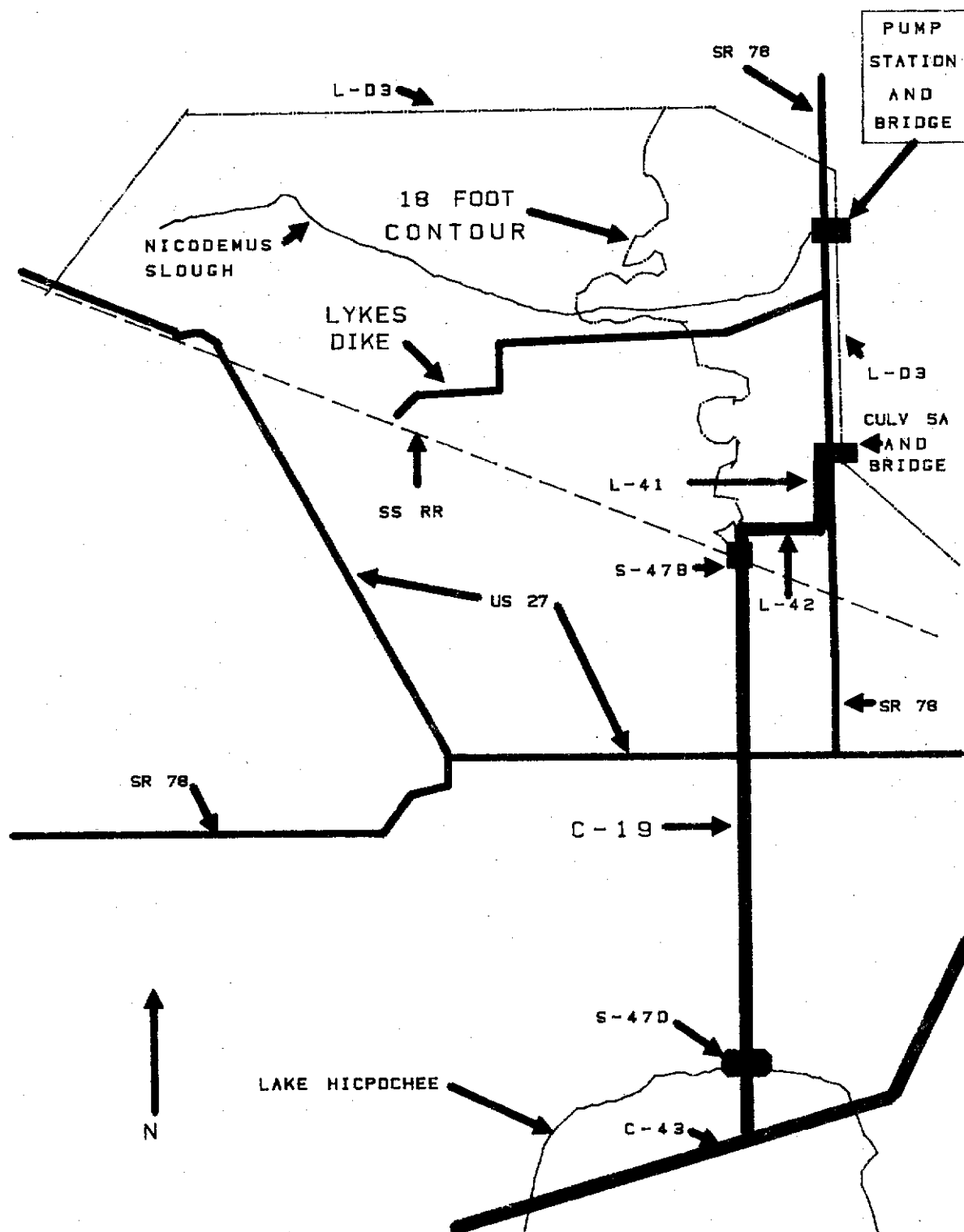


FIGURE 15
NICODEMUS SLOUGH
PLAN B

SCALE 1/2" = 1 MILE
(APPROXIMATE)

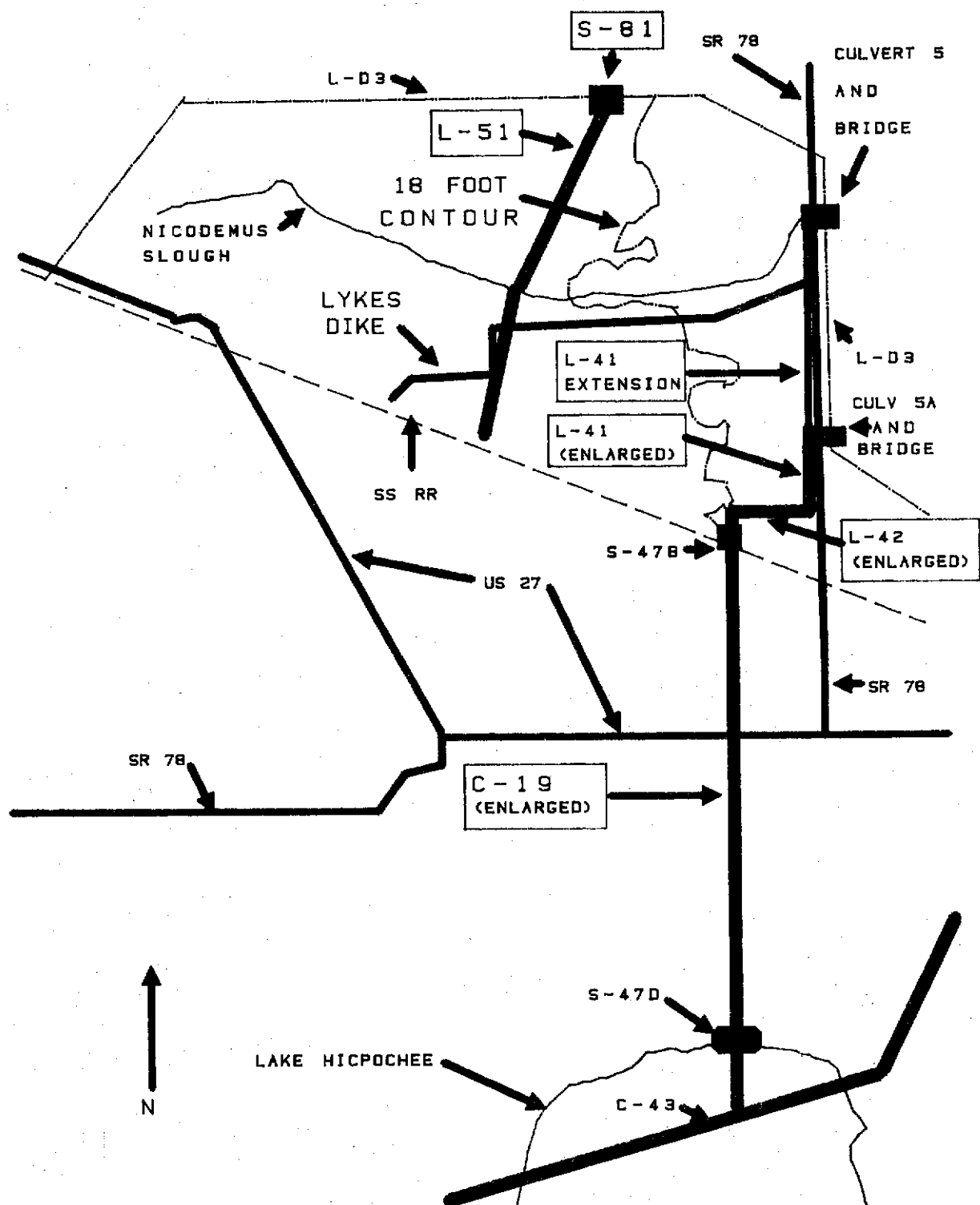


FIGURE 16
NICODEMUS SLOUGH
PLAN C

SCALE 1/2" = 1 MILE
(APPROXIMATE)

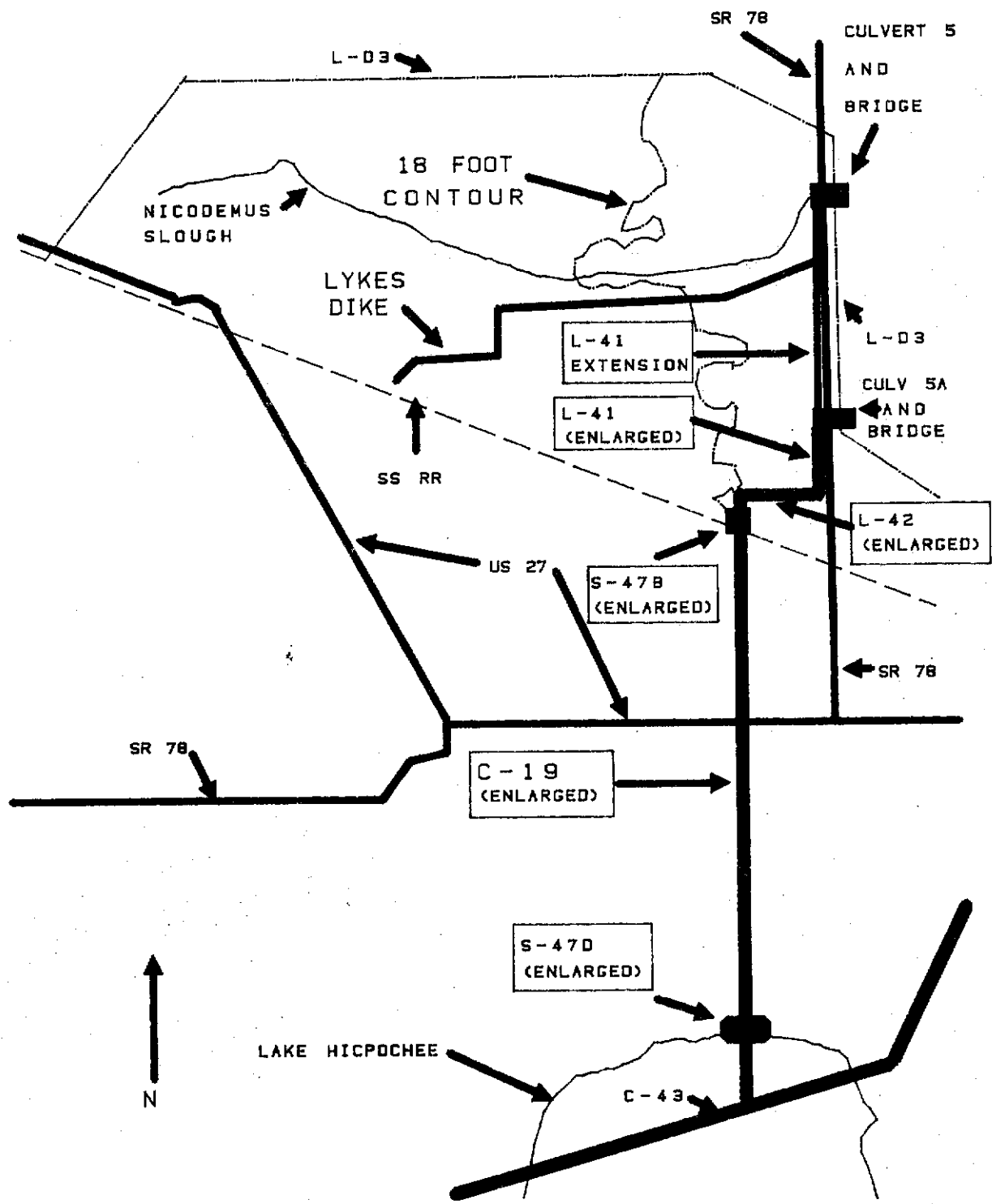


FIGURE 17
NICODEMUS SLOUGH
PLAN D

SCALE 1/2" = 1 MILE
(APPROXIMATE)

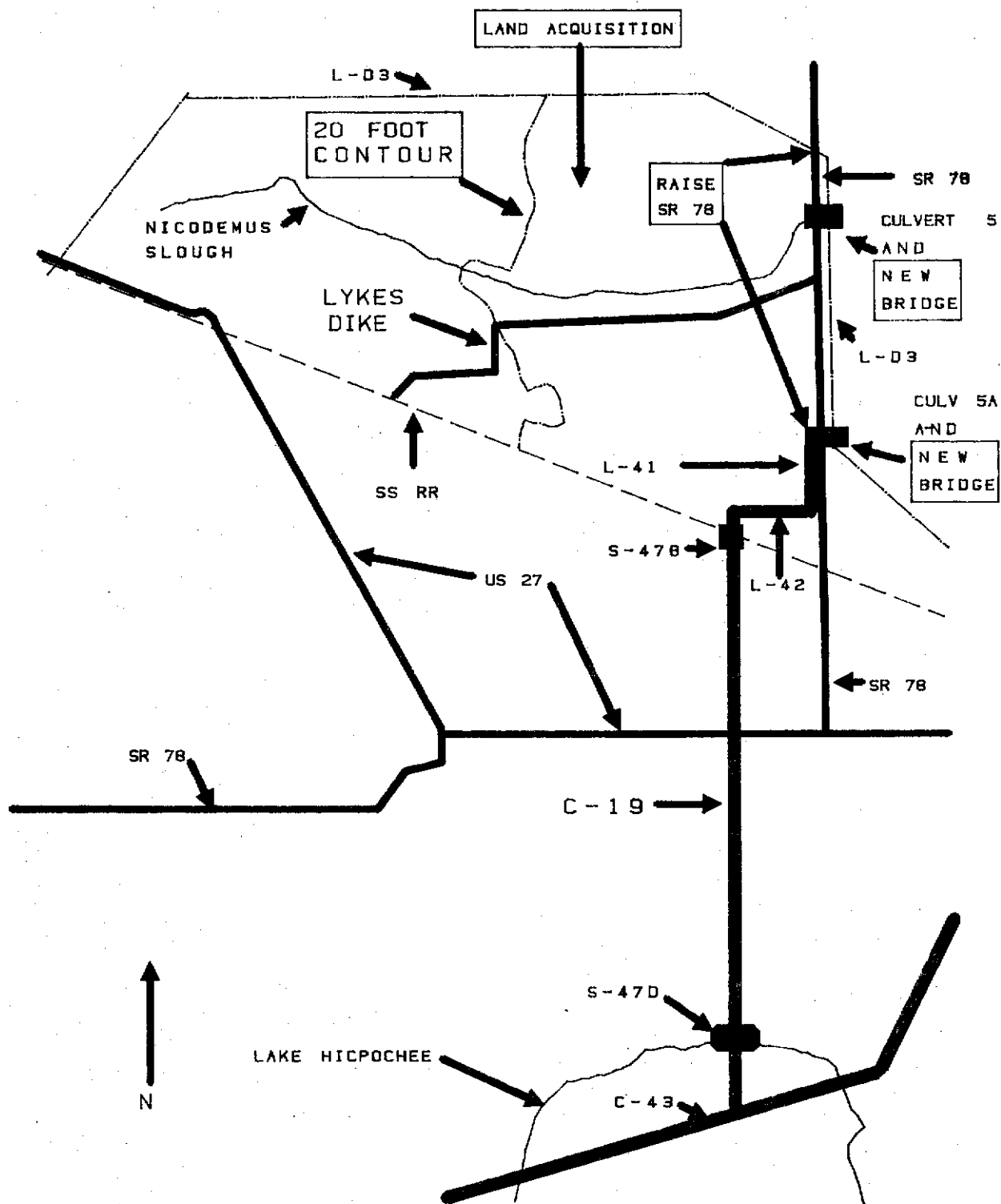


FIGURE 18
NICODEMUS SLOUGH
PLAN E

SCALE 1/2" = 1 MILE
(APPROXIMATE)

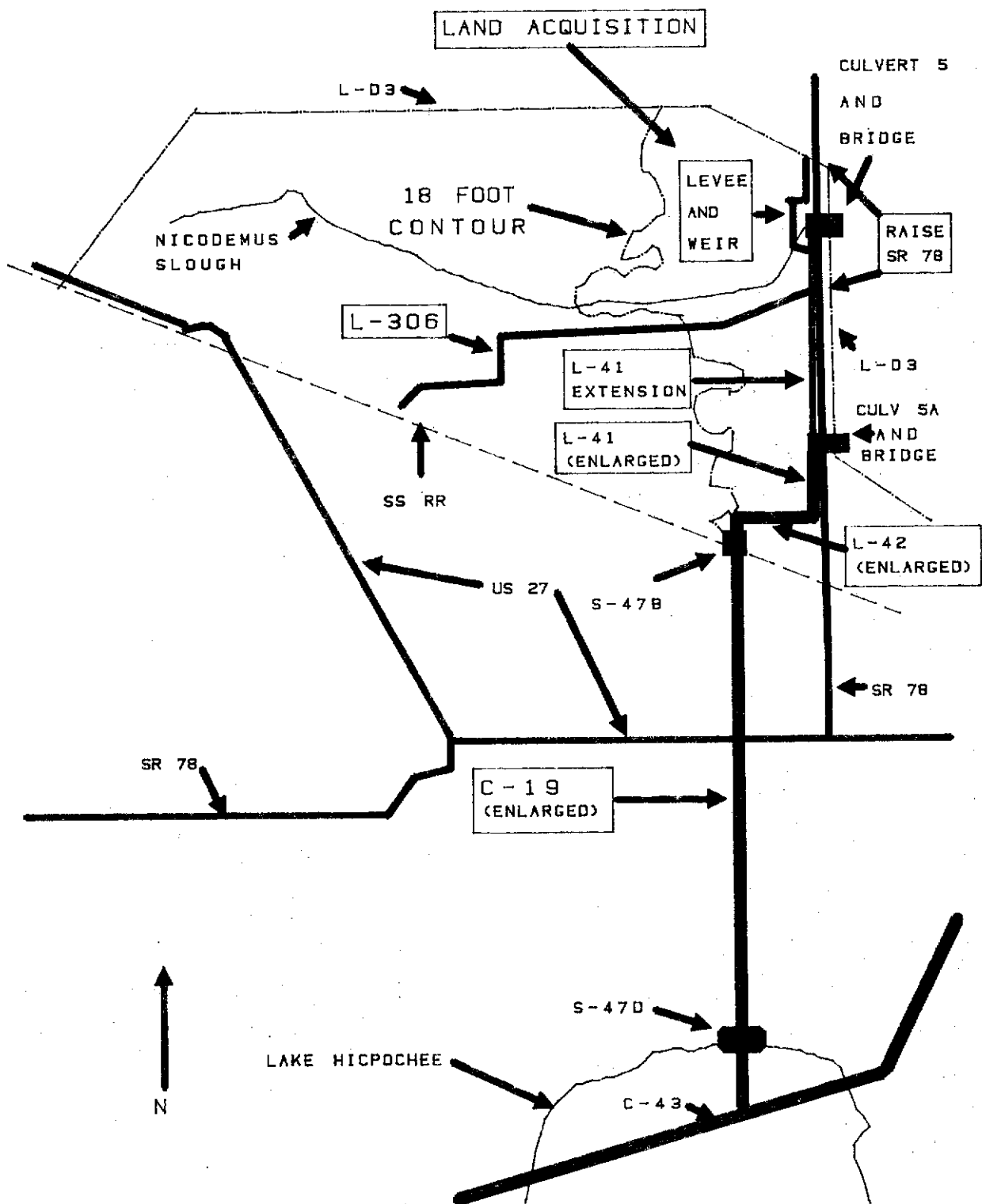


FIGURE 19
NICODEMUS SLOUGH
PLAN F

SCALE 1/2" = 1 MILE
(APPROXIMATE)

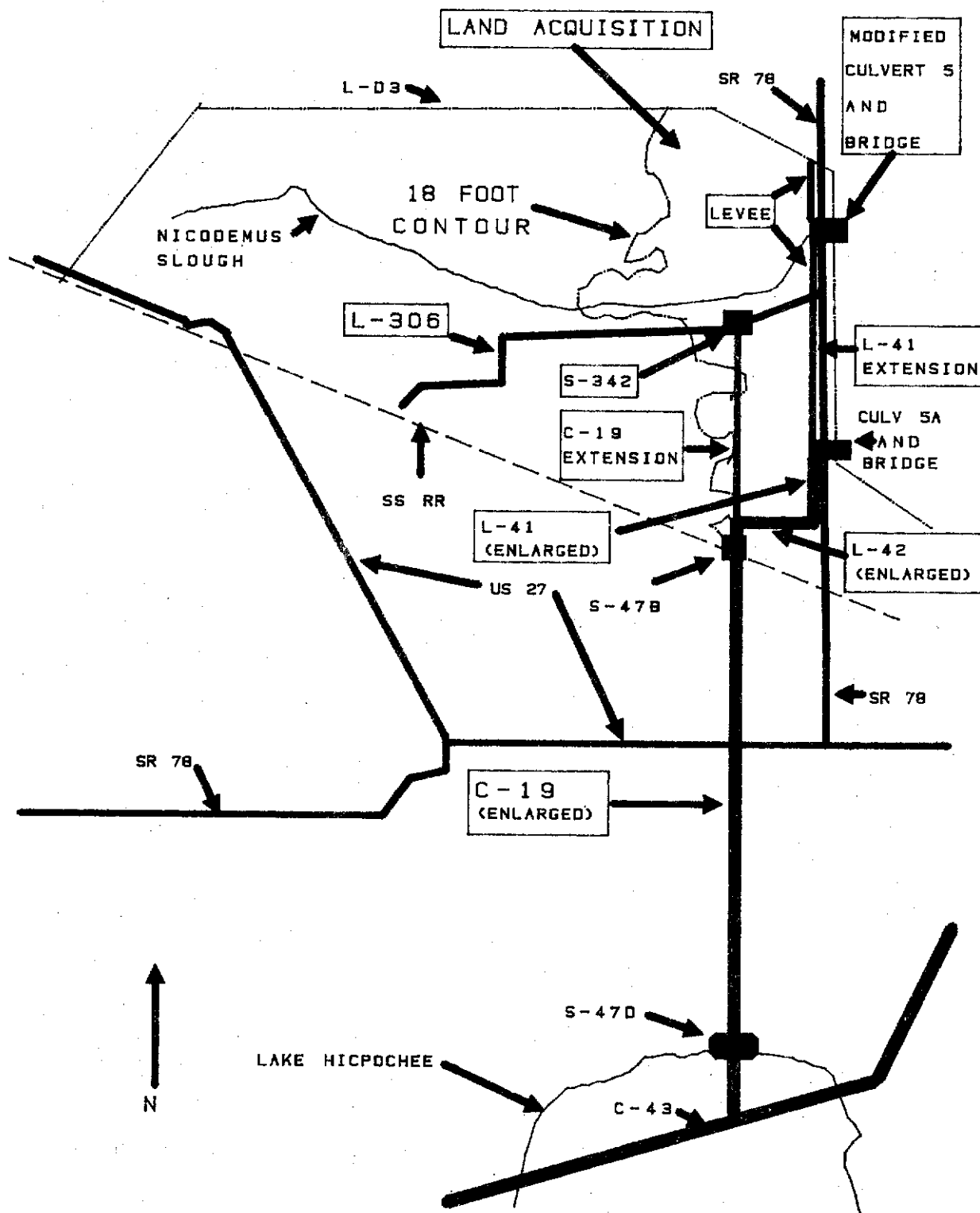


FIGURE 20
NICODEMUS SLOUGH
PLAN G

SCALE 1/2" = 1 MILE
(APPROXIMATE)

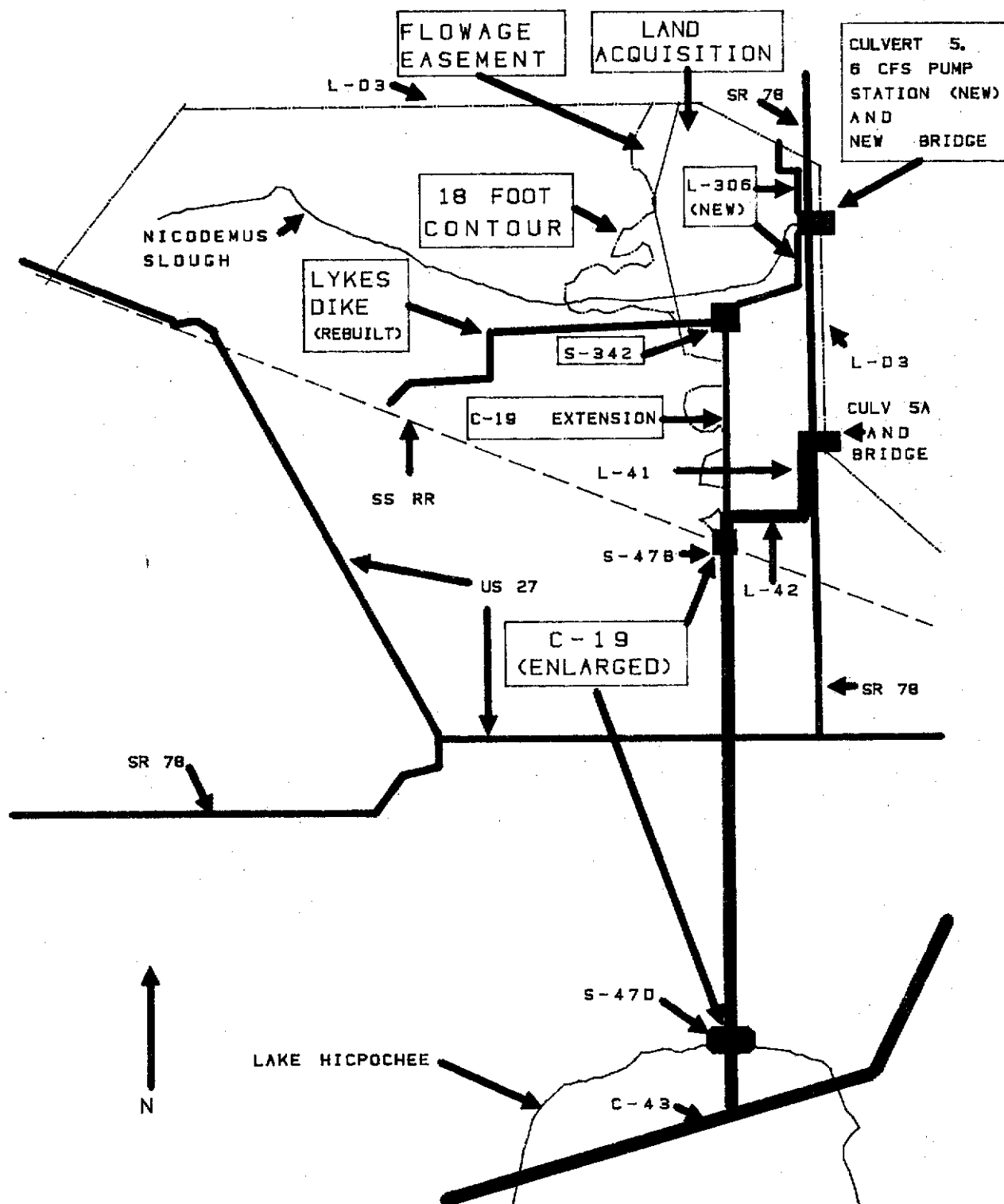


FIGURE 21
NICODEMUS SLOUGH
PLAN H

SCALE 1/2" = 1 MILE
(APPROXIMATE)

V. Coordination Summary

A. COE Project coordination

Various plans for the Nicodemus Slough area were developed by the U.S. Army COE since the original authorization (Plan A) in 1960. These included Plans A-G as described earlier herein. Intensive coordination efforts for a Nicodemus Slough area plan really began in the early 1970's as a result of the recommendation to raise the regulation schedule of Lake Okeechobee to 15.5' to 17.5' NGVD, since it was recognized that the higher regulation schedule would aggravate already existing flooding problems in Nicodemus Slough. These efforts are summarized in the COE's January 1982 General Design Memorandum for the Nicodemus Slough area, the last COE report issued for the project. Copies of correspondence from DER, the COE, and the U.S. Fish and Wildlife Service are included in Appendix I.

B. Major Projects review process

In late 1983 and early 1984, the District staff compiled a document, entitled "Project Planning and Construction," which outlined various water resource problems and proposed solutions. Projects were placed in one of three categories:

- (1) Design and construction,
- (2) Planning and coordination, or
- (3) non-assigned.

As a result of the Governing Board review process of that document, a new alternative (Plan H) emerged for the Nicodemus Slough area, and was placed in the Design and Construction category at the February 1984 Board meeting. Further, the District determined that the project would be implemented using District funds, rather than with federal financial participation. Although the Project Planning and Construction document has been updated twice since then, the Nicodemus Slough project has remained on the Design and Construction list.

C. Pre-application meetings

On August 27, 1985, a preapplication team traveled to both Tallahassee and Jacksonville to meet with State and federal regulatory agencies to discuss the proposed Nicodemus Slough project. A list of the participants and their respective agencies is included as follows.

**Nicodemus Slough Preapplication Meeting
August 27, 1985**

Morning - DER Office - Tallahassee

Steve Reel	South Florida Water Management District
Paul Millar	"
Jim Milleson	"
Zan Kugler	"
Mike Nagy	Department of Environmental Regulation
Doug Bailey	Game and Fish Commission
Louis Tesar	Division of Archives History & Records Management

Afternoon - COE Office - Jacksonville

Steve Reel	South Florida Water Management District
Paul Millar	"
Jim Milleson	"
Zan Kugler	"
Eric Hughes	Environmental Protection Agency
Joe Carrol	Fish and Wildlife Service
Burt Heimer	U.S. Army Corps of Engineers
Oswaldo Collazo	"
Marie Grisby	"
John Hashtak	"
Jorge Southworth	Department of Community Affairs

The purpose of the morning (Tallahassee) and afternoon (Jacksonville) meetings was to present the proposed project prior to finalization of the Nicodemus Slough planning report and solicit feedback on the project, predominantly from a regulatory point of view. The principle concerns/questions which were raised during the preapplication meetings were:

1. What is the operational strategy for the project once completed? Will the Slough's regulation schedule be managed from a lake tributary or an enhanced wetland rationale? The latter would require structural modifications to Culvert 5 to allow impoundment.
2. What will be the control elevation in the C-19 extension? The concern expressed was that too low a water level will vastly improve Lykes drainage and bleed down both Nicodemus Slough and regional groundwater levels.
3. Will the improved drainage south of Lykes Dike stimulate shifts and intensification of area crop production and how will that ultimately impact water quality?
4. Concern from the Corps that existing structures (primarily S-47B and S-47D) may not be capable of handling post project design discharges.
5. The final regulation schedule needs to be a compromise between the Florida Game & Freshwater Fish Commission and the State Division of Archives and History.

These concerns were addressed by District staff in finalizing this report.

VI. Selected Alternative

A. Rationale for Selection

Table 4 provides a comparison of all the considered alternatives. Most of the information was derived from the 1982 COE GDM (Table 2), and updated to include information on Plan H.

Based on this comparison, a modified Plan H (see Figure 22), as more fully described in B below, is considered the most practicable, least costly, and most environmentally acceptable alternative. It is a scaled down version of the COE's Plan G, since it does not include extending L-41 or enlarging L-41 and L-42 borrow canals, and enlarging C-19 only between U.S. 27 and S-47B.

This plan will permit implementation of the revised 15.5'-17.5' Lake Okeechobee regulation schedule while minimizing flooding problems in the developed part of Nicodemus Slough. It also offers a unique opportunity for wetlands restoration and enhancement through acquisition and subsequent management of the area north of the proposed L-306.

B. Specific Components

1. An east-west dike will separate the lower nine square miles currently in agricultural production from the remainder of the basin. The District will construct the portion of the dike (L-306) east of S-342. Lykes Inc. would be responsible for the remainder of the dike. This will provide the District with complete management capability for the detention area.
2. Acquisition (using Save Our Rivers funds) of fee title to approximately 2,000 acres north of L-306 and east of a north-south line located approximately 2310' east of the western boundary of Sections 5, 8 and 17, T41S, R32E. This a requirement of the SOR legislation.
3. Acquisition of flowage easements on all lands below the 18' NGVD contour line and lying northerly of the Seaboard System railroad, west of C-19 and C-19 Extension, and west of the fee title acquisition line.
4. Construction of C-19 extension from C-19 "bend" north to L-306, and enlargement of C-19 north of US 27 to S-47B to provide 10-year flood protection to the area south of L-306. The original design section for C-19 south of US 27 was determined to be adequate to pass the design flows.
5. Construction of an outlet structure (S-342) at the junction of C-19 extension and L-306, to provide the capability to remove excess water from the area north of L-306 during high water conditions.
6. Construction of a levee along the west side of State Road 78 from Culvert 5 north to LD-3 and raising SR 78 to an elevation not to exceed 24' NGVD in this reach to protect the road during high water conditions. The levee may be deleted pending discussions with the Florida DOT.
7. Acquisition of fee title to a small parcel of land in the northeast corner of the basin (near LD-3 and SR 78), including relocation of persons and equipment currently on the property. This was determined to be the most cost effective way to address the

flood protection problem for this parcel, which would result from implementation of the project. See Appendix II for more details.

8. Automation of S-47B.

9. Additional rip-rap immediately downstream of S-47D.

10. Replacement of the crossing over the L-41 borrow canal at Potato Farm Road with two 72" diameter culverts at invert elevation 7.0' NGVD.

11. Replacement of the SR 78 bridge at Culvert 5.

12. Install fencing along the west, east, and south boundaries of the fee title acquisition area to control access to the detention area.

13. Modification of Culvert 5 to add slide gates to the remaining two culverts. This is needed to hold higher water levels in the detention area during the wet season to create additional marsh habitat.

**Table 4
COMPARATIVE IMPACT OF ALTERNATIVES**

Base Conditions and Alternatives	Fish and Wildlife Resources	Threatened or Endangered Species	Water Quality	Archaeological and Historical Resources	Bridges and Roads	Wetlands	Farmlands
Base condition (no action) alternative	Little or no direct destruction. Prolonged inundation may create wet prairie and/or marsh habitat at expense of existing habitat.	No impact.	No impact.	Possible adverse impacts to elevated Indian mounds from cattle trampling during high water.	High water may cover SR 78 and threaten integrity of the road and bridges at culverts 5 and 5A.	No adverse impacts expected.	Flooding could adversely affect crops.
Plan A	Approximately 350 acres of terrestrial habitat cleared or altered. Possible wet prairie habitat due to increased flood protection. Little or no direct destruction of wildlife from project.	No adverse impact	Temporary turbidity associated with construction activities. No long-term adverse impacts anticipated. Lower ground water in vicinity of L-51. Natural drainage patterns interrupted by L-51.	Possible impact depending on canal alignment and pending outcome of archeological survey.	No impact.	No net loss expected. Some loss expected through construction activities, but new wetlands created by canal construction. Quality of wetlands may vary.	No adverse impact.
Plan B	Negligible impact on fisheries. New aquatic habitat will be constructed.	No adverse impact.	No adverse impact.	No adverse impact.	No impact.	Possible loss of wet prairie habitat because of increased flood protection.	No adverse impact.
Plan C	Clearing or alteration of 415 acres of pasture or low quality wildlife habitat. Eighty-two acres will be converted to canals; the rest will be replanted following construction. Possible net loss of wet prairie habitat because of increased flood protection. Negligible impact on fisheries resources. Some losses resulting from construction activities, but new aquatic habitat will be created.	Some wildlife habitat will be lost, but no direct adverse impacts expected	Temporary turbidity associated with construction activities. No long-term adverse impacts anticipated. Lower ground water in vicinity of L-51. Natural drainage patterns interrupted by L-51.	No adverse impacts expected. Flood control will indirectly protect elevated archeological sites from trampling by cattle during periods of flooding.	No impact.	Possible loss of wet prairie habitat because of increased flood protection. Eighty-two acres of canals will be created.	No adverse impact.
Plan D	Adverse impacts on wildlife will be associated with habitat changes or losses. Clearing or alteration of + 200 acres of pasture or low quality wildlife habitat may result in habitat changes or loss. Negligible adverse impact on fisheries resources. Some deterioration of habitat during construction, but long-term increase in aquatic habitat.	Except for some loss or alteration of low quality habitat, no adverse impacts anticipated.	Temporary turbidity may be associated with construction activities. No long-term adverse impacts expected.	No adverse impact.	No impact.	Temporary degradation of canals during construction. Increased canal area after project. Net gain in wetlands.	No adverse impacts.

**Table 4. (Continued)
COMPARATIVE IMPACT OF ALTERNATIVES**

Base Conditions and Alternatives	Fish and Wildlife Resources	Threatened or Endangered Species	Water Quality	Archeological and Historical Resources	Bridges and Roads	Wetlands	Farmlands
Plan E	<p>Little or no direct destruction. Adverse impacts associated with flooding. Prolonged inundation may create wet prairie and/or marsh habitat at expense of terrestrial vegetation.</p> <p>Fisheries resource impacts associated with periods of flooding may be short-term good or bad depending on extent, duration, and season of flooding. No long-term adverse impacts.</p>	No impact.	No impact.	Possible adverse impacts to elevated sites from cattle trampling during construction.	High water may cover SR 78 and threaten integrity of the highway and bridges at culverts 5 and 5A.	Prolonged inundation may create wet prairie and/or marsh habitat.	Prolonged flooding could destroy crops.
Plan F	<p>Loss of up to 2,800 acres of improved pasture and other terrestrial habitat, depending on acreage of water impounded. Wetland habitat (marsh and/or wet prairie) could replace terrestrial habitat throughout much of the impounded area. If water remains for an extended period of time, fishery resources could increase because of increased habitat.</p>	<p>Creation of a semi-permanent impoundment could benefit the Everglades kite and alligator but could adversely impact the Indigo snake. No other adverse impacts expected.</p>	<p>Temporary turbidity during construction activities. No water quality problems expected in semi-permanent impoundment. No long-term adverse impacts expected.</p>	Possible adverse impacts depending on final levee and canal alignments.	High water could threaten more than 6,000 feet of SR 78.	<p>Maintenance of a semi-permanent impoundment between Lake Okeechobee and the 18-ft. contour would provide conditions conducive to the creation of up to 3,000 acres of wetlands of varying quality. This type and amount of such wetlands will depend on the acreage of water in storage at any time and particularly, the length of time water is impounded.</p>	No adverse impacts.
Plan G	<p>Approximately 250 acres of pasture and low quality wildlife habitat cleared or altered. About 50 acres of canal habitat created. Little or no net loss of fish or wildlife resources expected over the long term.</p>	Possible loss of habitat for Indigo snakes. No other impacts expected.	<p>Temporary turbidity during construction. State Water Quality Standards will be met during construction. No long-term adverse impacts expected.</p>	<p>Same as Plans A and F. Prior to preparation of detailed plans and specifications, an archeological reconnaissance of proposed canal and levee alignments and other areas of possible construction activities will be conducted. Based on the results of this reconnaissance, final alignments and structure locations will be determined. If construction will adversely affect a site, all necessary mitigation measures will be taken. Indian mounds in the inspected area will be fenced to prevent cattle trampling during high water.</p>	<p>Implementation of this plan would necessitate raising of the SR 78 bridge at culvert 5 and construction of bridges over the L-41 and C-19 extensions.</p>	<p>Less than 5 acres of canal bottom would be filled during construction activities.</p>	No adverse impact.
Plan H	Same as Plan G	Same as Plans F and G	Same as Plan G	Possible effects on four Indian mounds	Raise SR 78 North of Culvert 5 and replace bridge at Culvert 5	<p>Creation of 1200-1300 acres of additional wetlands; minimal amount of wetlands to be replaced by borrow canals</p>	No adverse impacts

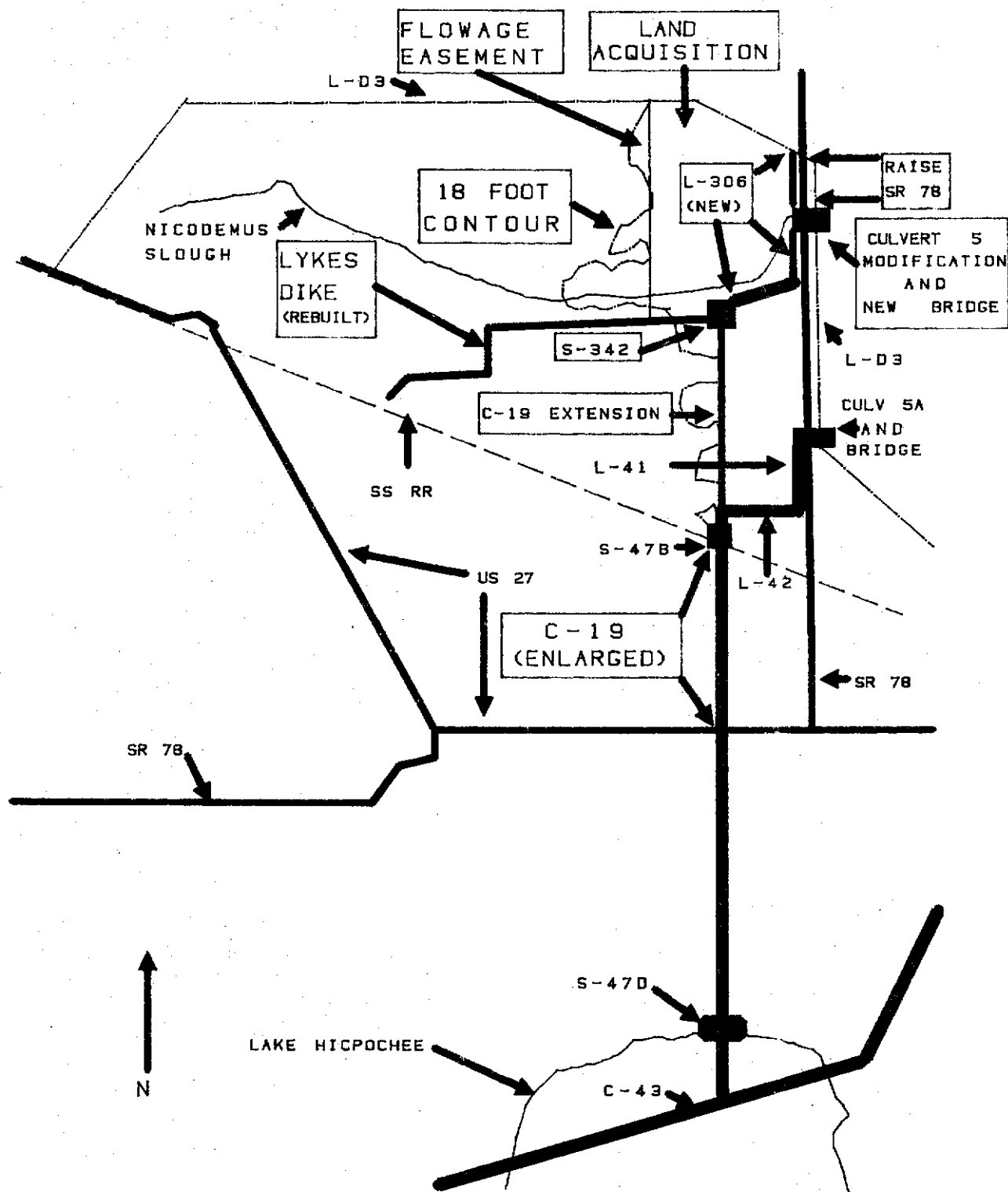


FIGURE 22
 NICODEMUS SLOUGH
 SELECTED PLAN

VII. Preliminary Field Investigation / Data Collection

A. Scope

The design recommendations in this section apply to the proposed earthwork for:

1. C-19 extension.
2. L-306 and its extension from Culvert 5 north to LD-3.
3. Lykes Dike modification.
4. Enlargement of C-19 north of US 27.

B. Field Investigations

Standard penetration tests in accordance with ASTM 1586, were performed along the alignments of the proposed and existing facilities for the purpose of identifying the subsurface materials to determine their characteristics as they relate to engineering construction. Plans of the test locations are on record in the Engineering Design Section drawing files. The drilling records are included in Appendix II.

C. Materials encountered

Silty fine sand and fine sand with lesser amounts of shell and clay are the predominant materials encountered throughout the project area. The subsurface materials are reasonably uniform as shown by the small variance of the solid descriptions of the 47 tests performed. The standard penetration resistance (blows/ft.), range from loose ($N = 10$ or less), for the fine silty sand, to firm ($N = 10$ to 50), and compact ($N = 50 +$), for the sand.

D. Record construction drawings

The Army Corps of Engineers record drawings of C-19, dated 1958, were examined and compared to recent cross sections to determine if improvements should be made on previous design criteria. The drawings indicated a required side slope for the cut sections of 1:2, and for fill section of 1:3. The Corps' as-built cross sections indicate an over excavation considerably greater than the required design excavation. The excess spoil was deposited on the top and easterly side slope of the design levee. A comparison of recent cross sections with the as-built data available, indicated 1 to 3 feet of deposition of material on the canal bottom in the southerly portion of the reach (south of US 27). The side slopes appeared to have been flattened slightly in those areas constructed to a 1:2 side slope to grade approaching 1:2.5. Those slopes constructed at the flatter grades showed little change.

E. General Design Memorandum

Review of the Army Corps of Engineers' General Design Memorandum for the Nicodemus Slough Area, dated January 1982, indicate a 1:2 side slope for excavation and a 1:3 side slope for the embankments was used in their hydraulic and construction design recommendations. These recommendations were based on geologic investigations made for the design of C-19 and the Lake Okeechobee Levee.

F. Design Recommendations

The limiting slope for cohesionless soils can be taken as the angle of internal friction. For sand and silty sand this angle varies from 27-33 degrees for loose conditions and 30-35 degrees for dense conditions. Using an angle of 30 degrees and a design side

slope of 1 vertical on 2 horizontal affords a safety factor of 1.15. However, for those slopes below water, a reduction of intergranular pressure due to submergence can be expected. It follows, a greater safety factor should be considered for those areas. This recommendation is further justified based on the comparison of the recent cross sections and the Corps record drawings made in paragraph D, above, which appears to indicate the soil's natural repose to be 1:2.5. Using a design slope of 1 vertical on 2.5 horizontal would increase the safety factor to a value of 1.44.

For the embankment areas, use of an internal friction angle of 30 and design side slope of 1 vertical and 3 horizontal would produce a safety factor of 1.73. The use of erosion protection in the form of grassing would be required.

VIII. General Engineering Data

A. Canal 19 Enlargement (north of US 27)

Length (miles)	2.0
Bottom width (feet)	20.0
Bottom elevation (NGVD)	6.0
Side slopes	1:2.5
Amount of material	65,000 cubic yards

B. Canal 19 Extension

Length (miles)	2.3
Bottom width (feet)	7.0
Bottom elevation (NGVD)	7.0
Side slopes	1:2.5
Amount of material	173,000 cubic yards

C. Levee 306

Length (miles)	2.0
Top elevation (ft.)	24.5*
Crown width (ft.)	10.0
Side slopes	1:3

* or 4' above natural ground, whichever is greater

D. Lykes Dike

Length (miles)	4.7
Top Elevation (ft.)	24.5*
Crown Width (ft.)	10.0
Side Slopes	1:3

NOTE: The west end will be tied into the Seaboard Systems Railroad grade. A culvert will be placed in the railroad ditch (size will be determined by SSRR).

* or 4' above natural ground, whichever is greater

E. Structure 342

Location	Junction of L-306 and C-19 Ext.
Type of structure	1-72" CMP with flashboard riser
Invert elevation (NGVD)	7.0

F. State Road 78 Bridge

Low member elevation (NGVD)	21.0
Type	Two lane
Design flow (cfs)	2,000
Design water surface elev. (NGVD)	19.5
Min. required area (sq. ft.)	670 below 19.5
Bridge section	
Bottom width (ft.)	36
Bottom elev. (NGVD)	7.0
Side slopes	1:1.5

G. Potato Farm Road Crossing (Culverts)

No. and dia. (in.) Two-72" CMP's with screw gates
 Invert elev. (NGVD) 7.0

H. C-19 Extension Inflow Control Culverts (all standard riser/control)

<u>Station</u>	<u>Bank</u>	<u>No. & Dia.</u>	<u>Invert Elev. (NGVD)</u>	<u>Crown Elev. (NGVD)</u>
122 + 00	W	1-72"	7.0	14.5
122 + 25	E	1-42"	11.0	14.5
58 + 45	W	1-72"	11.0	14.5
58 + 45	E	1-48"	11.0	14.5
57 + 26	W	1-72"	9.0	14.5
57 + 66	E	1-48"	11.0	14.5
5 + 20	W	1-72"	10.0	10.0

Station 0 + 00 located at south end of C-19 Extension

I. Culverts in Lykes Dike

<u>Designation</u>	<u>Location</u>	<u>Dia. (in.)</u>	<u>Riser/Control</u>
1	Near N 1/4 Corner Sec.25/ 41/31 (in levee)	48	Standard
2	Near N 1/4 Corner Sec. 25/ 41/31 (in borrow canal)	30	None
3	On N/S 1/4 Line Sec. 19/41/31 (in levee)	48	Standard

J. Design sections for C-19 Extension and C-19

See Figures 23, 24, 25, 26, 27 and 28.

FIGURE 23
CANAL 19 EXTENSION
TYPICAL SECTION

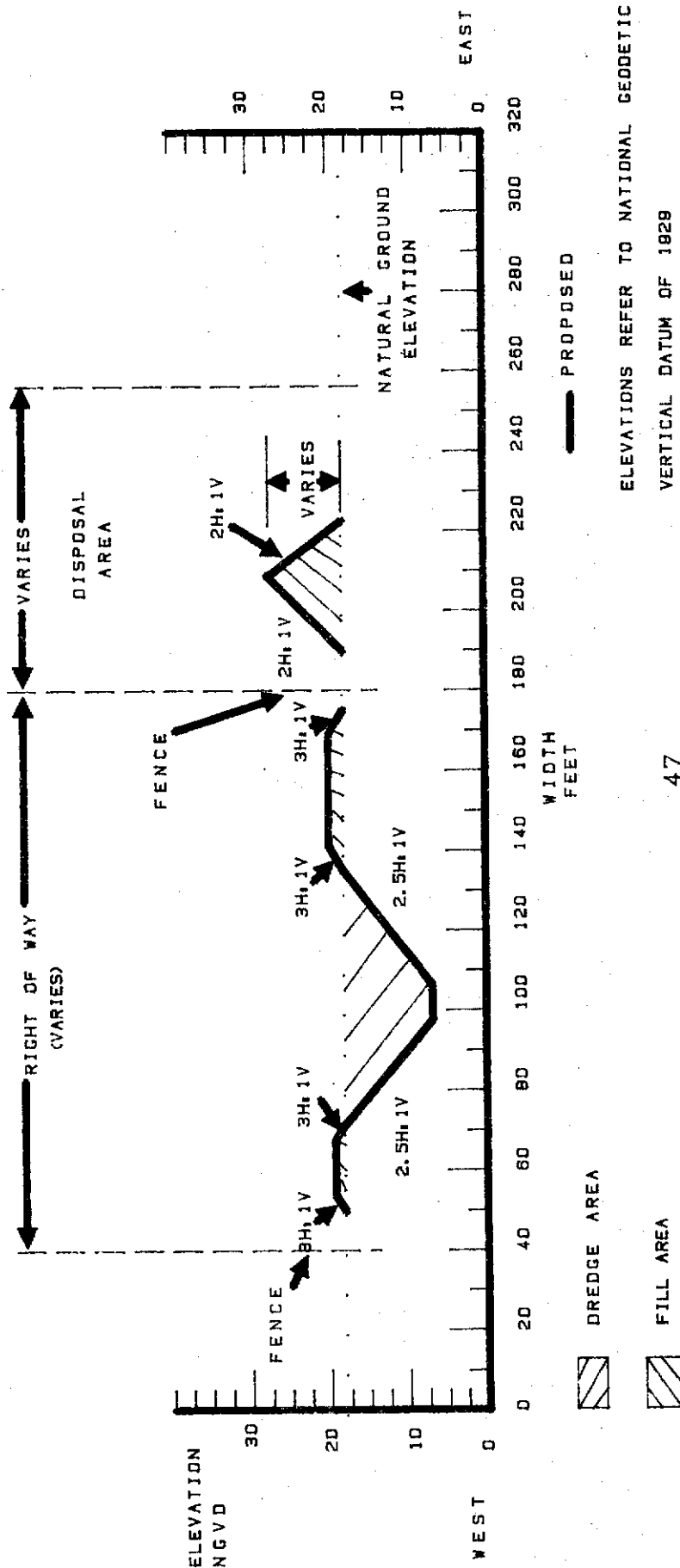


FIGURE 24
CANAL 19 TYPICAL SECTION
FROM S-47B TO CANAL 19 EXTENSION
(NO CHANGES)

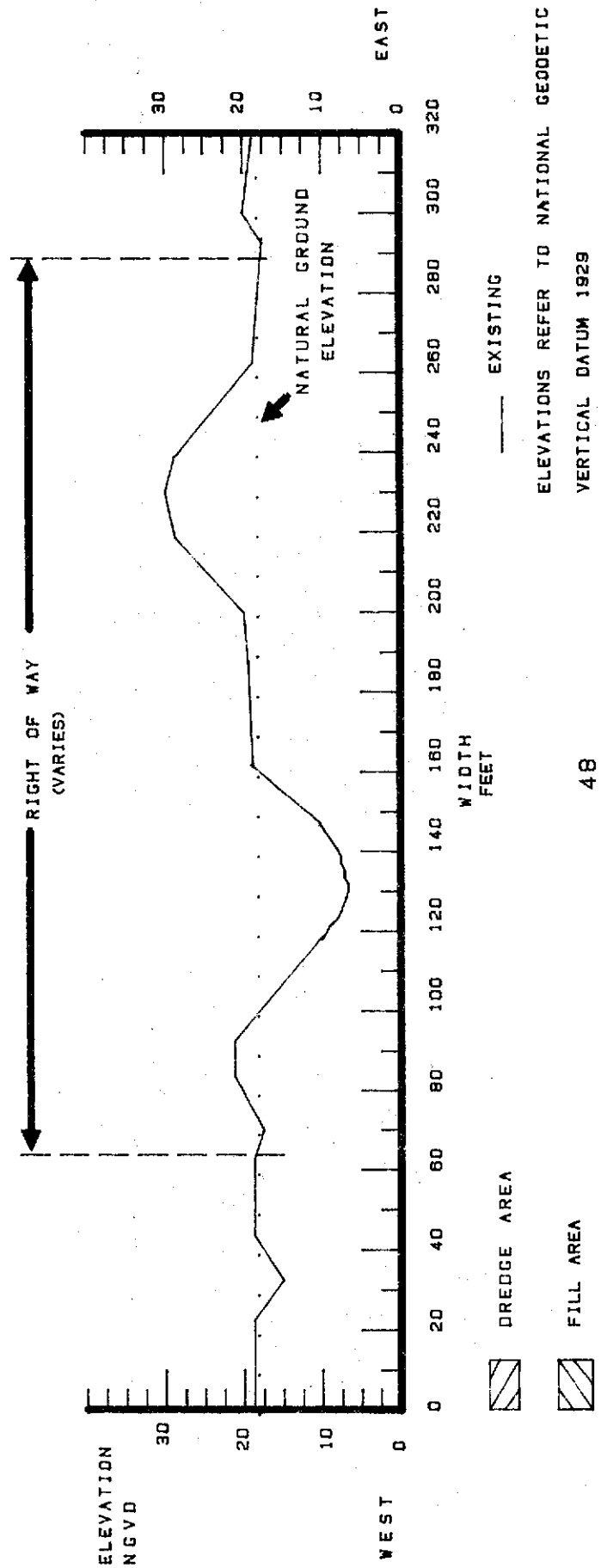


FIGURE 25
CANAL 19 TYPICAL SECTION
FROM US 27 TO S-47B

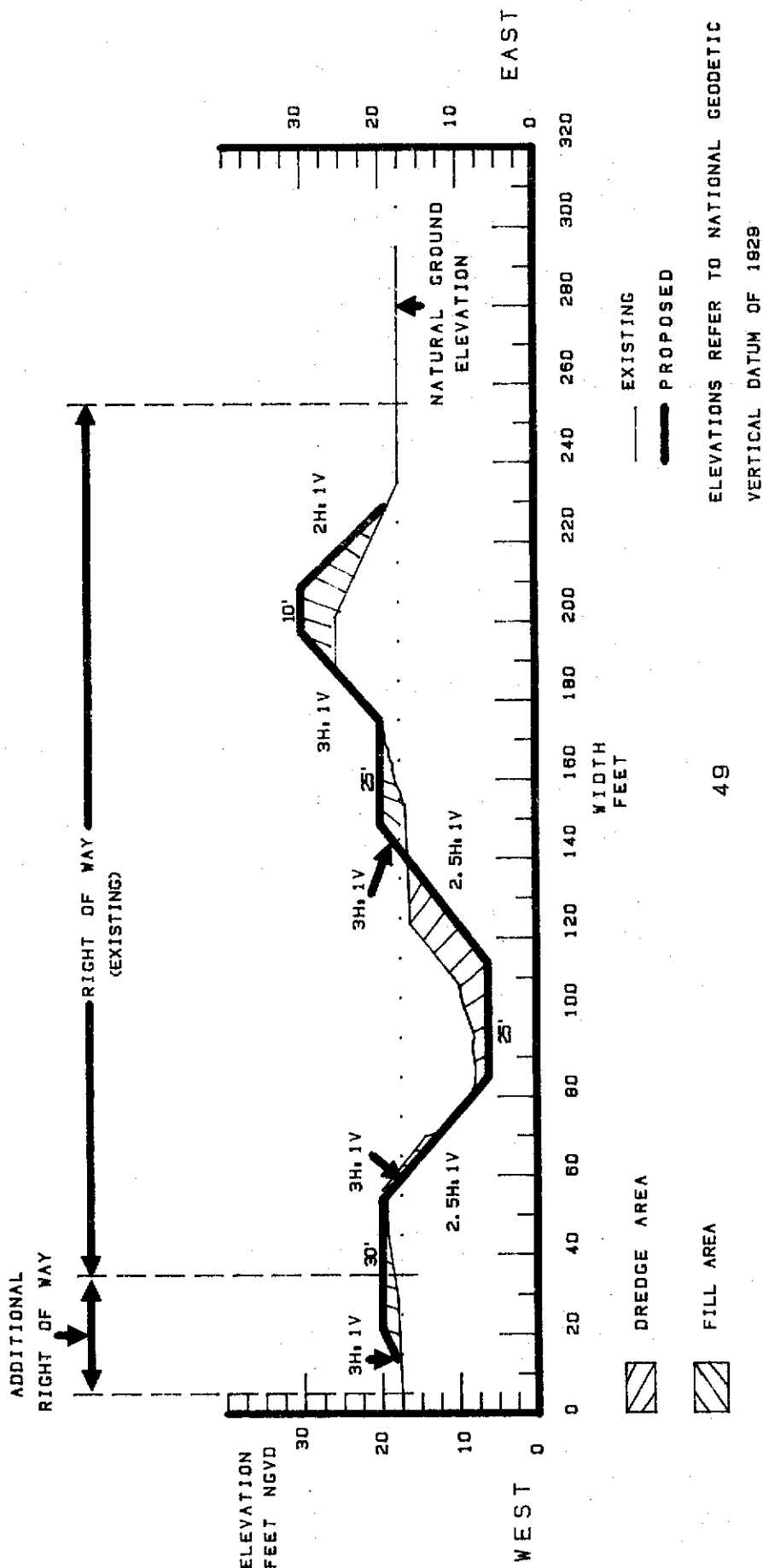
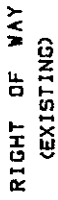
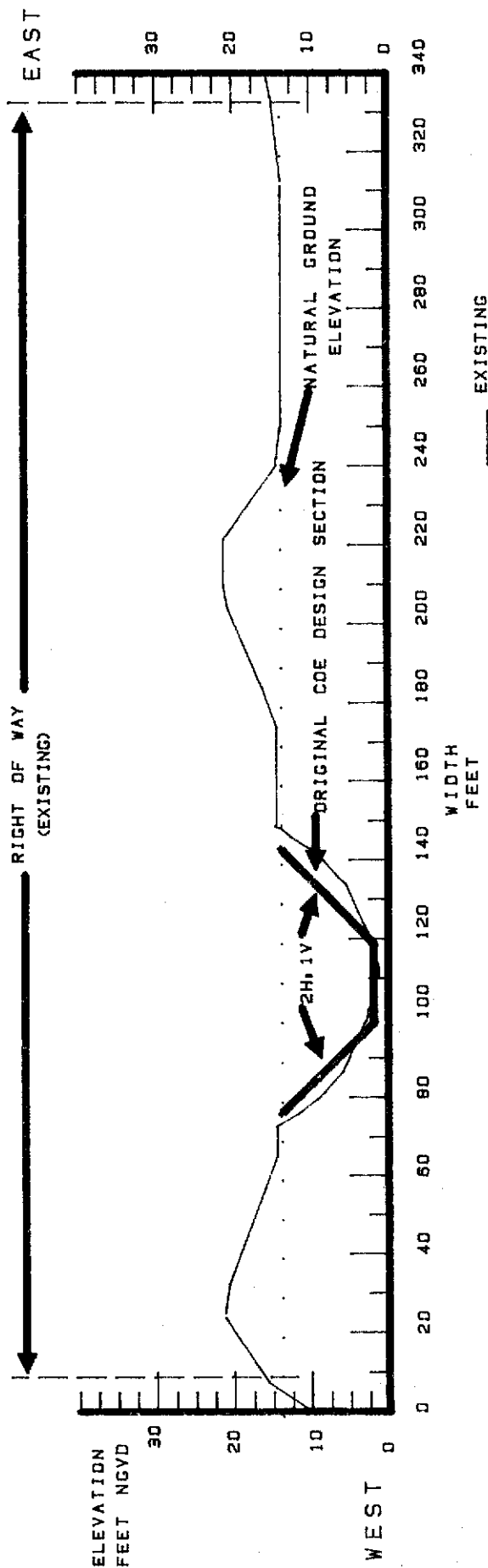


FIGURE 26



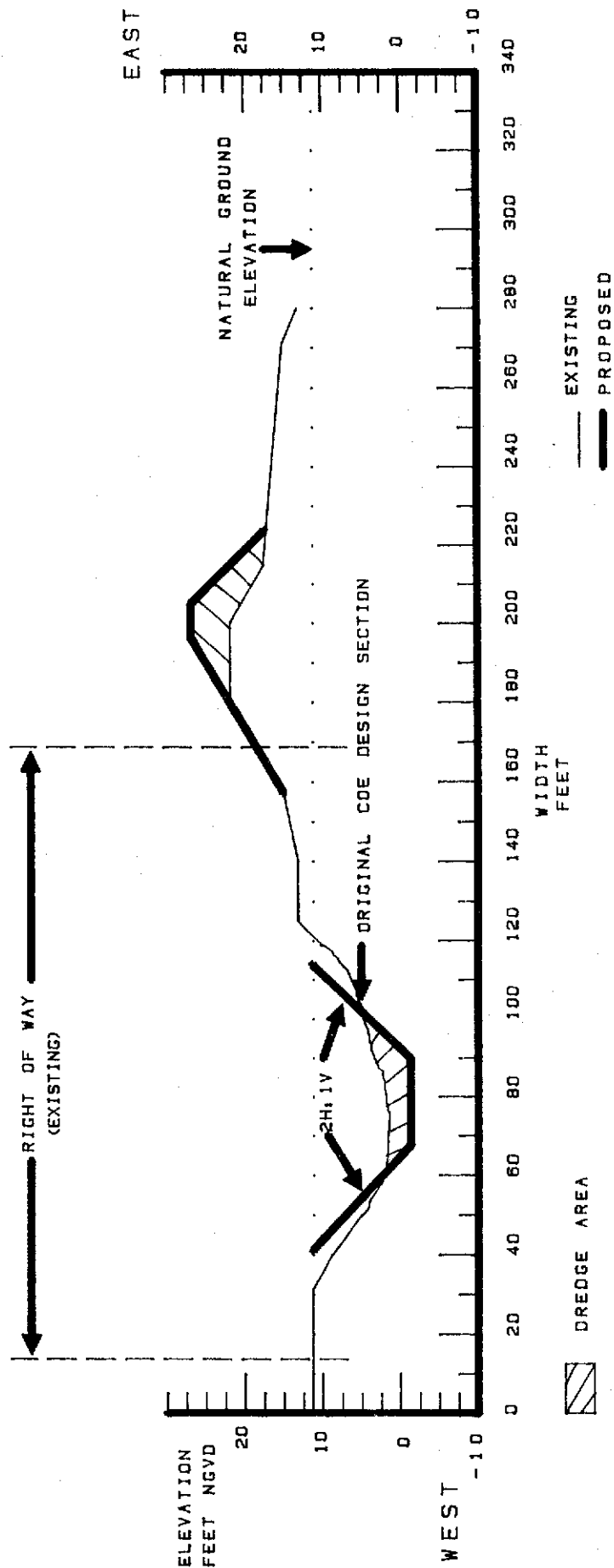
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FIGURE 27
CANAL 19 TYPICAL SECTION
FROM S-47D TO STATION 172+00
(NO CHANGES)



ELEVATIONS REFER TO NATIONAL GEODETIC
VERTICAL DATUM OF 1929

FIGURE 28
CANAL 19 TYPICAL SECTION
BELOW S-47D
(MAINTENANCE DREDGING)



B. Hydrology/Hydraulics

1. Discharge capacity

The proposed design discharge capacity is 250 cfs flow through S-47B, which would be allowable at all times. Flows of 400 cfs through S-47B are allowable when the downstream basin can accept it.

For S-47D the proposed design discharge capacity is 1195 cfs with a HW stage of 12.90' NGVD, and a TW stage of 12.16 ft NGVD. The design TW at S-47B is 14.03 ft NGVD. The system will pass 400 cfs with a HW stage at S-47D of 12.60 ft NGVD, and a TW stage at S-47B of 13.46 ft NGVD. See Tables 5, 6, and 7 for specific details of the hydraulic design.

Enlarging C-19 north of US 27 and automating S-47B will make it possible to operate C-19 and C-19 Ext. at their respective optimums, as long as water is available to the system via excess stormwater runoff or releases from Lake Okeechobee for irrigation purposes through Culvert 5A.

Automation of S-47B is recommended to make it possible to hold a wet season optimum water control elevation of 13 ft. NGVD, and a dry season optimum of 15 ft NGVD. When in operation, the headwater elevation for S-47B would fluctuate +/- 0.2' NGVD from the normal control elevation.

After implementation of the Project, average monthly stages in Nicodemus Slough would be somewhat higher, since it is anticipated that Culvert 5 modification and subsequent operation will allow greater detention of water in the fee title acquisition area during the wet season to promote creation of additional marsh habitat. When stages in Nicodemus Slough reach 17 ft NGVD, it will be necessary to start discharging south through S-342 to C-19 and east through Culvert 5 to keep the stage in the slough from exceeding 18 ft NGVD, the proposed upper limit of District owned land in the Slough area.

An environmentally sound water level schedule for Nicodemus Slough will be refined once more detailed land elevation information is obtained. Little detailed information currently exists on the topography within the Nicodemus Slough area below the 18 foot contour line. The best available information suggests that the main channel of Nicodemus Slough and adjacent marshes are about 15 feet NGVD or below, with the remaining area sloping gradually upwards.

Since structure S-342 is designed to discharge water southward from Nicodemus Slough through C-19 EXT when the stage within the slough exceeds 17 feet NGVD, there is a potential to manage water levels on approximately 1200 acres of land below the 17 ft. contour.

An annual water regulation schedule ranging between 14 and 17 NGVD is suggested, subject somewhat to stages in Lake Okeechobee. Assuming that Lake Okeechobee is at a stage of 14 feet or lower on June 1, Culvert 5 gates would be closed, and water allowed to impound in Nicodemus Slough from local rainfall and runoff according to the following schedule for the first year of operation.

June 1-June 30	15.0
July 1 - July 30	15.5
August 1-August 31	16.0
September 1-September 30	16.5
October 1-November 30	17.0
December 1-December 31	16.5
January 1-January 30	16.0
February 1-February 28	15.5
March 1-March 31	15.0
April 1-April 30	14.5
May 1-May 31	14.0

This will provide a gradual inundation rate during the first year to assist in aquatic vegetation establishment. A less complex control schedule is suggested for subsequent years, which will allow the slough to rise more abruptly in the early wet season if rainfall and runoff are sufficient (see Figure 29).

Dry season releases may be made through Culvert 5 to Lake Okeechobee if the stage difference allows, or early dry season releases can be made, to the extent possible, through S-342 for supplemental irrigation in the downstream agricultural area.

It is apparent that during years when Lake Okeechobee is at its' flood regulation levels, the scheduled lows of Nicodemus Slough will be unattainable, and Culvert 5 should be opened, allowing Nicodemus Slough to recede at the same rate as the Lake.

Other potential schedules are possible for implementation, depending on specific management goals (i.e. wading bird feeding vs. waterfowl hunting). However, each of these would be subject to the same limitation of a 17 foot high, and a low dependent on Lake Okeechobee stages.

Table 5
C-19 with 400 cfs Discharge

	Station	Des BW Ft.	Des B El Ft.	Side Slopes	Hdy X-Sec Sq. Ft.	Des Q CFS	DWS Ft.	Velocity Ft/Sec.
	278 + 50	Existing		2H:IV	--	400	--	--
	258 + 00	Existing		"	--	400	--	--
	238 + 00	Existing		"	--	400	--	--
Below S-47D	217 + 50	Existing		"	--	400	--	--
Above S-47D	216 + 50	Existing		"	640	400	12.50	0.62
	194 + 00	Existing		"	640	400		
	167 + 00	Existing		"	640	400	12.56	0.62
Below Hwy 27	1 + 00	Existing		"	649	400	12.60	0.62
Above Hwy 27	130 + 00	25	6.0	2.5H:IV	280	400	12.68	1.43
	120 + 00	25	6.0	"	280	400	12.78	1.43
	110 + 00	25	6.0	"	292	400	12.89	1.37
	100 + 00	25	6.0	"	294	400	12.98	1.36
	90 + 50	25	6.0	"	300	400	13.07	1.33
	65 + 50	25	6.0	"	313	400	13.29	1.28
Below S-47B	43 + 00	25	6.0	"	325	400	13.46	1.23
Above S-47B	241 + 00	20	6.4	2H:IV	242	400	13.96	1.65
	253 + 16	20	8.3	"	211	400	14.16	1.90
	263 + 16	20	8.1	"	228	400	14.36	1.75
	273 + 16	20	7.1	"	274	400	14.49	1.46
End of C-19	284 + 56	20	8.3	"	242	400	14.64	1.65
Begin C-19 Extension	0 + 00	7	7.0	2.5H:IV	198	356	14.46	2.01
	3 + 30	7	7.0	"	202	356	14.70	1.98
	13 + 30	7	7.0	"	207	284	14.82	1.93
	33 + 30	7	7.0	"	216	284	15.03	1.85
Below Potato Farm Road	58 + 00	7	7.0	"	230	284	15.26	1.74
Above Potato Farm Road	58 + 60	7	7.0	"	235	122	15.43	1.70
	58 + 80	7	7.0	"	235	122	15.43	1.70
	89 + 00	7	7.0	"	235	---	---	1.70
S-342	112 + 00	7	7.0	"	235	80	15.46	1.70

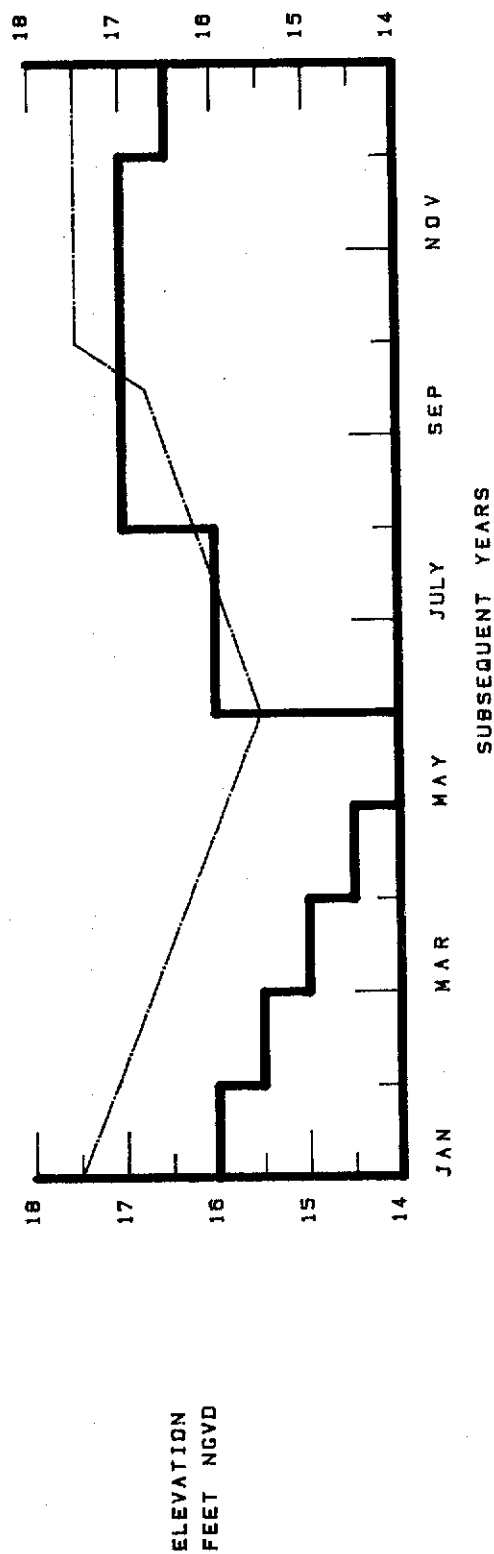
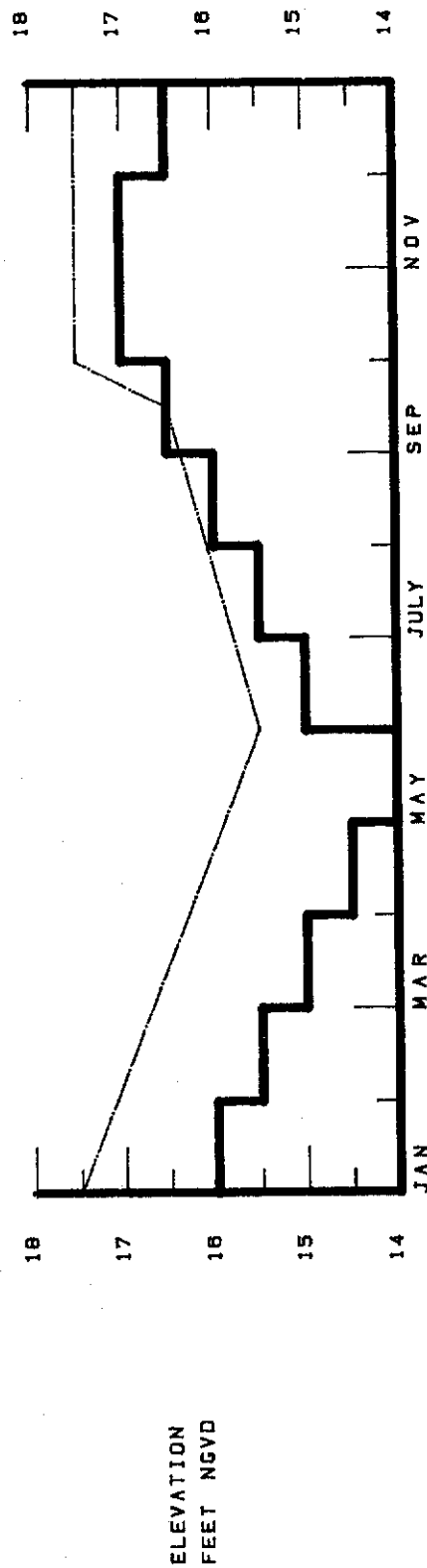
Table 6
C-19 Discharge With a Fixed
250 CFS Flow Through S-47B

	Station	Des BW Ft.	Des B. El Ft.	Side Slopes	X-Sec Sq. Ft.	Des. Q CFS	DWS Ft.	Velocity Ft/Sec
	278 + 50	Existing		2H:IV	1064	1430	11.58	1.80
	258 + 00	Existing		"	820	1660	11.75	2.09
	238 + 00	Existing		"	834	1660	11.96	2.03
Below S-47D	217 + 50	Existing		"	829	1660	12.16	2.00
Above S-47D	216 + 50	Existing		"	695	1195	12.90	1.72
	194 + 00	Existing		"	699	1195	13.12	1.72
	167 + 00	Existing		"	704	1195	13.45	1.70
Below Hwy 27	131 + 00	Existing		"	734	1195	13.79	1.63
Above Hwy 27	130 + 00	25	6.0	2.5H:IV	349	750/365	13.84	2.16
	120 + 00	25	6.0	"	--	--	--	--
	110 + 00	25	6.0	"	--	--	--	--
	100 + 00	25	6.0	"	--	--	--	--
	90 + 50	25	6.0	"	361	365	14.02	1.05
	65 + 50	25	6.0	"	367	365	14.13	1.02
Below S-47B	43 + 00	25	6.0	"	373	365	14.22	1.00
Above S-47B	241 + 00	20	6.4	2H:IV	272	250	14.70	0.92
	253 + 16	20	8.3	"	241	250	14.76	1.04
	263 + 16	20	8.1	"	250	250	14.81	1.00
	273 + 16	20	7.1	"	290	250	14.85	0.86
End of C-19	284 + 56	20	8.3	"	256	250	14.90	0.98
Begin C-19	0 + 00	7	7.0	2.5H:IV	211	223	14.90	1.06
Extension	3 + 30	7	7.0	"	211	223	14.92	1.06
	13 + 30	7	7.0	"	211	178	14.96	0.84
	33 + 30	7	7.0	"	216	178	15.04	0.82
Below Potato Farm road	58 + 00	7	7.0	"	223	178	15.14	0.80
Above Potato Farm Road	58 + 60	7	7.0	"	223	76	15.20	0.34
	58 + 80	7	7.0	"	223	46	15.20	0.21
	89 + 00	7	7.0	"	223	46	15.21	0.21
S-342	112 + 00	7	7.0	"	223	46	15.22	0.21

Table 7
C-19 Profile with 175 cfs Discharge
From Nicodemus Slough Detention Area

	Station	Des BW Ft.	Des B. El Ft.	Side Slopes	Hyd X-Sec Sq. Ft.	Des Q CFS	DWS Ft
	278 + 50	Existing		2H:IV	--	--	--
	258 + 00	Existing		"	--	--	--
	238 + 00	Existing		"	--	--	--
Below S-47D	217 + 50	Existing		"	--	--	--
Above S-47D	216 + 50	Existing		"	641	350	12.50
	194 + 00	existing		"	--	--	--
	167 + 00	Existing		"	641	350	12.53
Below US 27	131 + 00	Existing		"	645	350	12.57
Above US 27	130 + 00	25	6	2.5H:IV	273	325	12.63
	120 + 00	25	6	"	277	320	12.70
	95 + 00	25	6	"	292	305	12.86
	70 + 00	25	6	"	294	290	12.98
Below S-47B	43 + 00	25	6	"	304	275	13.10
Above S-47B	241 + 00	20	6.4	2H:IV	208	250	13.19
	253 + 16	20	8.3	"	170	250	13.32
	263 + 16	20	8.1	"	188	250	13.45
	273 + 16	20	7.1	"	221	250	13.55
End of C-19	284 + 56	20	8.3	"	190	250	13.65
Begin C-19	0 + 00	7	7	2.5H:IV	--	--	--
Extension	13 + 30	7	7	"	159	225	13.84
	33 + 30	7	7	"	176	225	14.09
Below Potato	58 + 00	7	7	"	186	225	14.34
Farm Road							
Above Potato	58 + 60	7	7	"	203	225	14.72
Farm Road	58 + 80	7	7	"	207	225	14.79
	89 + 00	7	7	"	211	225	14.93
S-342	112 + 00	7	7	"	218	225	15.08
Above S-342	--	--	--	--	--	175	17.50

FIGURE 29
PROPOSED NICODEMUS SLOUGH REGULATION SCHEDULE



GATES SHOULD BE OPENED
IF STAGE AT CULVERT 5 EXCEEDS LINE.
CLOSED IF BELOW LINE

LAKE OKEECHOBEE
FLOOD REGULATION SCHEDULE

C. Preliminary Construction Costs

Estimates of the preliminary costs for construction of the various components of the Nicodemus Slough/C-19 Project were prepared and are listed below:

<u>Item</u>	<u>Cost</u>
Canal 19 enlargement	\$ 260,000
Canal 19 extension	690,000
L-306	605,000
S-342	75,500
Raise SR 78 north of culvert 5	260,000
Automation of S-47B	100,000
Rip-rap downstream of S-47D	30,000
Potato Farm Road crossing	76,000
Replacement of L-41 borrow canal crossing	20,000
SR 78 bridge replacement	270,000
Fence west, east and south sides of detention area (approx. 5.6 miles)	14,000
Fence C-19 Extension (approx. 6.4 miles)	16,000
Culvert 5 Modification	400,000
Total	\$2,816,500

These will be refined during the detailed design process.

D. Land Acquisition

Preliminary estimates of land acquisition needs are as follows:

<u>Item</u>	<u>Area (acres)</u>
Fee title, north of L-306	2000
Flowage easements	470
Pearce Property	10
Canal R/W, Disposal Area, Potato Farm Road Easement	<u>72</u>
Total	2552

Final costs will be determined through negotiations with the individual affected landowners.

IX. Environmental Assessment

A. Existing Conditions

1. Flora

The watercourse has been channelized and the spoil placed in irregular mounds along the channel. Vegetative communities in the basin vary from open water in the channel to maiden cane marsh, broadleaf marsh, wet prairies, improved and unimproved pasture, sugarcane, oak-cabbage palm hammocks, and disturbed communities. The National Wetland Inventory project of the US Fish and Wildlife Service (FWS) lists 950 acres below the 20-foot contour line as palustrine-narrow leaved persistent-seasonal water and ditched. District staff, using 1985 data, estimate 510 acres of wetlands below the 18' NGVD contour in the proposed fee title acquisition area.

2. Fauna

The drainage basin is populated by numerous species of song birds, wading birds, and others including the wild turkey, snail kite, and bald eagle. Herptofauna includes frogs, toads, snakes, turtles, lizards, and the American alligator. Mammals include deer, wild hog, squirrel, rabbits, and rodents.

3. Threatened or Endangered Species

Endangered species that may occur in the project area include the snail kite, bald eagle, red-cockaded woodpecker, and Florida panther. Threatened species include the alligator and Eastern indigo snake.

4. Wetlands

The National Wetland Inventory of the FWS lists 950 acres below the 20-foot contour line in Nicodemus Slough as palustrine-narrow leaved persistent-season water and ditched. As noted above, District data indicate 510 acres below the 18' contour in the fee title acquisition area.

B. Effects of Proposed Project

1. Fish and wildlife resources

Alteration will occur to the unimproved pasture and other terrestrial habitat, depending on the amount of water detained. Wetland habitat (marsh and/or wet prairie) could replace terrestrial habitat throughout much of the detention area. If the water is detained for a long period, fishery resources could be increased due to increased habitat. Approximately 250 acres of pasture and low quality wildlife habitat will be cleared or altered by construction activities. Approximately 50 acres of this total will become canals. Little or no indirect destruction of wildlife is expected, although indirect losses may result from habitat reduction. Some reduction in fishery resources may occur because of construction activities, but additional habitat will be created, as described earlier.

2. Threatened and Endangered Species

Creation of a detention area could benefit the snail kite and the alligator. No other adverse impacts are expected.

3. Wetlands

Maintenance of a detention area between Lake Okeechobee and the 18' contour would provide conditions conducive to the creation of 1200 to 1300 acres of additional wetlands. The type and amount of such wetlands will depend on the acreage of water in storage at any time and, particularly, the length of time water is impounded and the seasonal fluctuation schedule.

X. Water Quality Assessment

A. Water Body Classifications

The waters in Nicodemus Slough are classified as Class III - Recreation and Propagation of Fish and Wildlife.

B. Existing Water Quality Conditions

The waters of Nicodemus Slough have an average total phosphorous concentration of 0.055 mg/l (COE, 1982), of which 20% is in the form of orthophosphorous. The slough represents the lowest concentration of phosphorous entering Lake Okeechobee with a concentration similar to rainfall (Table 8). The total nitrogen concentration in Nicodemus Slough averages 1.71 mg/l (COE, 1982) with 83% being in organic forms. Compared to the other 14 major inflows to the Lake, 12 have higher nitrogen concentrations than Nicodemus Slough. The low nutrient concentrations, coupled with high organic fractions, indicate that the waters of Nicodemus Slough do not reflect adverse impacts from the watershed activities.

C. Effects of Proposed Project

The target total phosphorous and nitrogen concentrations for the water quality management of Lake Okeechobee, as implied in the Lake Okeechobee Operating Permit, are 0.212 and 1.64 mg/l, respectively. The total phosphorous concentration in Nicodemus Slough is substantially below the target concentration and the total nitrogen concentration is essentially the same as the target concentration. Therefore, the Project is not anticipated to have adverse impacts on the eutrophication of the Lake.

The total phosphorous and nitrogen concentrations in Nicodemus Slough are substantially below the levels in C-19 at S-47D (0.284 and 2.66 mg/l, respectively) and in the Caloosahatchee River in the vicinity of Lake Hicpochee (0.08 and 2.25 mg/l, respectively) (Technical Publication # 82-4). Therefore, the proposed project is not expected to have adverse impacts on the nutrient quality of C-19, the Caloosahatchee River, or Lake Hicpochee.

Table 8
Mean Concentrations
for Lake Okeechobee Inflows

Inflow	Total P mg/l	Inflow	Total N mg/l
S-191	0.912	S-2	6.18
S-127	0.427	S-3	5.34
S-4	0.360	S-4	3.00
S-133	0.333	S-191	2.38
S-71	0.248	S-72	2.35
S-72	0.223	S-71	2.29
Fisheating Creek	0.200	S-127	2.26
S-129	0.195	S-133	2.04
S-2	0.143	S-129	2.03
S-131	0.139	S-135	2.01
S-135	0.138	S-131	1.80
S-3	0.123	Fisheating Creek	1.78
S-65E	0.095	Nicodemus Slough	1.71
S-84	0.069	S-65E	1.40
Rainfall	0.061	S-84	1.29
Nicodemus Slough	0.055	Rainfall	1.07

Table 9
Nutrient Comparison for C-19,
Lake Hicpochee and Nicodemus Slough

	TP	OP	TN	InN	Source
C-19 at S-47D	0.284	0.187	2.66	0.43	SFWMD(81-83)
Caloosahatchee River at Lake Hicpochee	0.08	0.05	2.25	0.25	TP#82-4
Nicodemus Slough	0.055	0.01	1.71	0.29	COE (1982)

XI. Archeological and Historical Assessment

A. General

The National Register of Historic Places was consulted during the COE coordination and review process during the 1970's. No National Register Places were listed in the project area. By letter from the COE dated March 24, 1976 the State Division of Archives, History, and Records Management, and the National Park Service (NPS) were notified of the proposed action and their comments requested. In a letter dated May 25, 1976, the NPS referred to five archeological sites listed in a small study done in 1975 (Carr, 1975). On August 23, 1976 the State Historic Preservation Officer, by letter, listed six known archeological sites, including the Nicodemus Earthwork site (see Figure 30). This site is one of the largest known prehistoric Indian mound and earthwork complexes in south Florida and is considered eligible for listing in the National Register by the State Historic Preservation Officer.

By letter of September 3, 1976 the COE requested from the NPS a determination of eligibility for inclusion in the National Register of the six archeological sites pursuant to 36 CFR 800.4(a)(2), in compliance with the National Historic Preservation Act of 1966 and Executive Order 11593.

The most recent statement of concerns were contained in a letter dated July 14, 1981 from the Florida Division of Archives, History and Records Management and are as follows:

"We have separately reviewed each aspect of the revised Plan G of the Nicodemus Slough project, and have the following comments:

- 1) The proposed new canals extending northward along the east and west sides of Areas 2, 3, and 6 are located, with the exception of the area around the Indian mound (site 8GL 60), in areas deemed unlikely to contain significant site remains. The area within 1/4 mile of 8GL 60, a site deemed eligible for listing on the National Register of Historic Places, needs to be field checked by a professional archaeologist to determine in consultation with this agency the extent of any associated village or possible cemetery remains. Once this determination has been made, it is recommended that construction in this area be allowed to proceed with the proviso that construction damage in the form of excavation or haul roads avoid the mound and any identified associated area. With the above exception, construction of the proposed canals in the identified locations may proceed without further involvement with this agency;

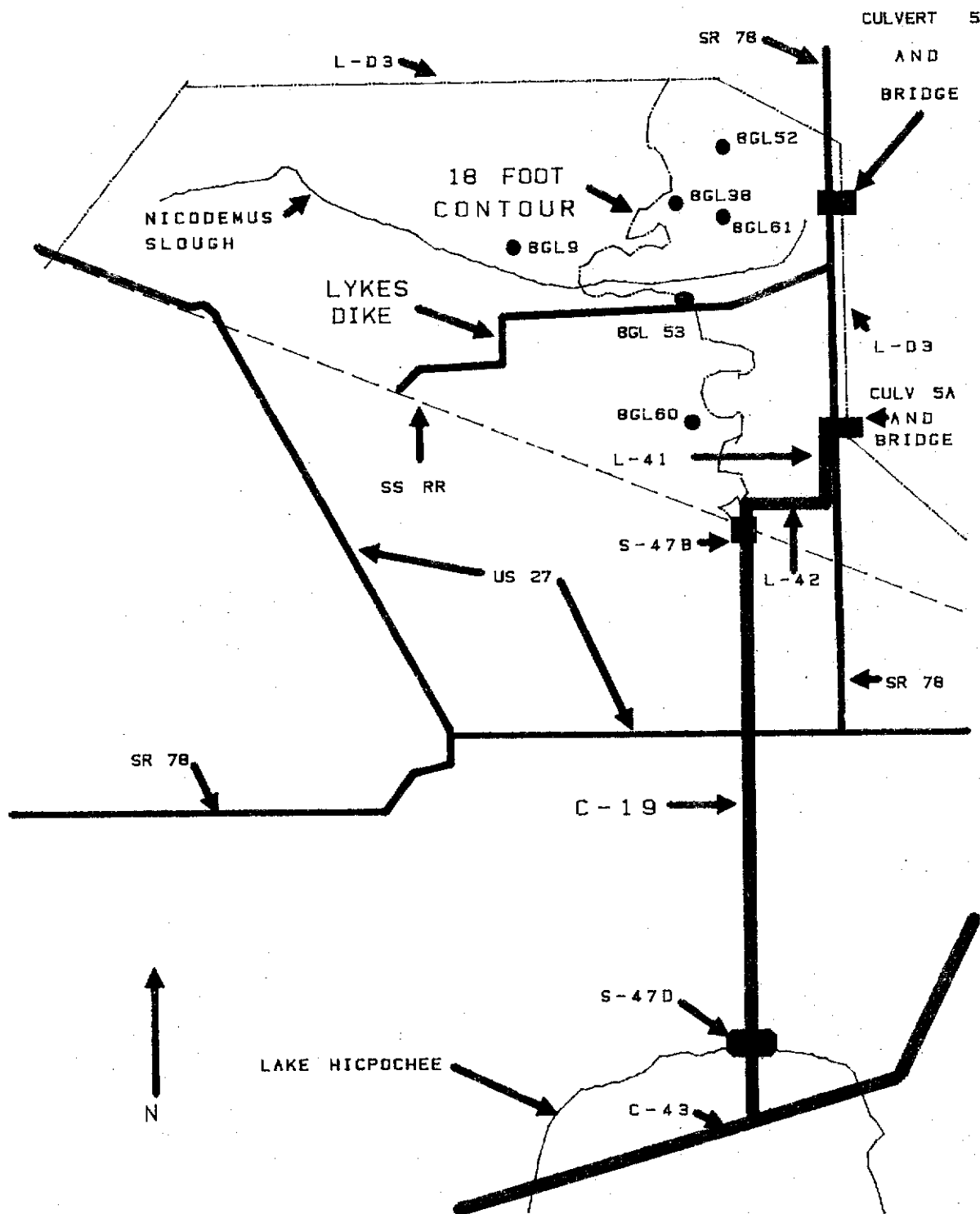


FIGURE 30
INDIAN MOUND LOCATIONS

SCALE 1/2" = 1 MILE
(APPROXIMATE)

2) Construction of the proposed S342 culvert on the common line separating the SW 1/4 of Sec. 16 from the SE 1/4 of Sec. 17, T41S-R32E is deemed unlikely to affect significant cultural remains if construction impact activities, such as haul roads, stockpiling of excavated materials, stockpiling of construction materials or equipment parking, are prohibited in the area immediately to the west of the proposed culvert location. The Gator Mound (8GL 53) site, a site deemed eligible for listing on the National Register of Historic Places, is located around 1/4 mile west of the proposed project. Furthermore, village area and possible cemetery remains associated with 8GL 53 would be expected to occur within a 1/4 mile radius of that site. If construction impact to the general area West of S-342 cannot be avoided, then it is recommended that the work be proceeded by an archaeological site assessment survey, and that specific identified site loci be avoided and protected by construction impact, or that the impact be mitigated by archaeological salvage excavation in the affected areas;

3) The modification of existing Culverts 5A, and S47B and the enlargement of existing spillway S47-D are deemed unlikely to affect any sites listed, or eligible for listing, on the National Register of Historic Places and may proceed without further involvement with this agency;

4) The construction of the two new bridges over the C-19 canal is deemed unlikely to affect any sites listed, or eligible for listing, on the National Register of Historic Places, and may proceed without further involvement with this agency; and,

5) The proposed L-306 Levee and associated borrow canal construction has the potential for both direct and indirect project impact. It is discussed in project segments to facilitate its impact evaluation:

a) Beginning near the Sportsman Village Boat Ramp and proceeding southward along the West side of SR 78 to the NE corner of Area 2 and thence WSW to Culvert S-342 the levee and associated borrow canal are located such that they are deemed unlikely to directly affect any archaeological or historic sites listed on the National Register of Historic Places, and its construction may therefore proceed without further involvement with this agency;

b) On the other hand, proceeding westward from proposed culvert S-342 the proposed Levee L-306 and its associated borrow canal runs adjacent to site 8GL 53, the Gator Mound - a site deemed eligible for listing on the National Register of Historic Places, and crosses several other locales deemed likely to contain significant, presently unrecorded site remains, such as villages, hamlets, and cemeteries. Furthermore, judging from the location of the proposed U.S. Highway 27 bridge to the immediate South to that road, the location of the "existing levee" symbol a like distance South of the Herbert Hoover dike on the north, and similar displacements of other symbols on the blue line copy of the proposed plan submitted to this agency for review, it appears as if the project overly accidentally shifted one eighth inch to the South on the area quadrangle map. If this is the case then the proposed levee will actually directly include site 8GL 53 and any associated village area within its fill zone.

c) Once the L-306 levee is completed Area 1 will have a water retention capability in excess of its present capacity. While Culvert 5 and the S342 culvert will permit the retained water to drain from the area, ground water saturation of the area will nevertheless be increased. As noted in earlier reports and correspondence, Cow Mound (8GL 52) is already experiencing such effects from extant facilities, and it is

anticipated that site 8GL 38, 8GL 53, and 8GL 61 (see maps), would be similarly affected once the proposed levee and associated works are completed. As previously noted we consider these sites to be eligible for listing on the National Register of Historic Places. Also, it has previously been determined in inundated studies funded in part by the Corps of Engineers that the anticipated hydrologic conditions resulting from the proposed work will have an adverse effect on sites like those within the project area. We, therefore, repeat our earlier recommendations that an archaeological site assessment survey including limited test excavation at sites 8GL 38, 8GL 52, 8GL 53, and 8GL 61 be conducted prior to permitting project related water retention in Area 1. The resulting report should be submitted to this agency for review and comment; and,

d) The Nicodemus Earthworks (8GL 19) are located in Area 1 above the 20 foot contour line. It is the opinion of this agency that the proposed project will not affect this significant site. Therefore, no additional work at this site is recommended; although, its preservation continues to be urged. "

B. Mitigation

Although this review related to Plan G, many of the concerns still pertain to the recommended Plan, but others do not. District staff met with the staff of the Florida Division of Archives, History and Records Management (DAHRM) in April 1986 to discuss these issues. After discussion of how this project differs from the COE proposal and how it will function, the items were resolved (see Appendix III).

APPENDIX 1
Coordination Correspondence



United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 2676

Vero Beach, Florida 32960

May 15, 1980

District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32201

Dear Sir:

The U.S. Fish and Wildlife Service has reviewed Plan G proposed for the Nicodemus Slough portion of the Central and Southern Florida Flood Control Project. The project area is located south of Fisheating Creek and west of Lake Okeechobee in Glades County, Florida. The Plan has had several modifications; therefore, we will address our understanding of the Plan. We have written three previous reports on this phase of the project (April 23, 1957, December 13, 1974, and August 13, 1975). The latter two reports recommended that flowage easements be obtained for the area and that levees and canals not be constructed. Our comments are being submitted as a planning-aid letter in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

Plan G is a combination of the structural and non-structural alternatives that were presented in 1974. Plan G, as we currently understand it, includes the following:

1. Levee 51 will be constructed from its northern terminus at Culvert 5 south along the western side of State Road (S.R.) 78 to the northern edge of improved land and then west to the Seaboard Coastline Railroad.
2. The borrow canal will be placed on the west side of the canal parallel to S.R. 78 and the north side of the canal from S.R. 78 west for about one mile. From this point west, canal placement is not defined at this time.
3. Canal 19 will be extended north and parallel S.R. 78 about one mile west of the road rather than being constructed adjacent to the road.

4. Culvert A will be placed in Levee 51 about one mile west of S.R. 78 rather than in the canal at S.R. 78.

5. Culvert A will be constructed to permit drawdown of Nicodemus Slough if that is necessary.

6. Railroad and highway bridges may have to be modified for this project.

The project area, 39 square mile drainage basin, is bounded on the east, north and west by Lake Okeechobee Levee D3 and on the south by the Seaboard Coastline Railroad. The slough proper has been channelized with the spoil placed in irregular piles along the channel. Land elevations range from about 15 feet mean sea level at Culvert 5 and S.R. 78 to about 35 feet mean sea level at the western edge of the project area. Approximately 25 percent, 6,400 acres, of the drainage basin is less than 18.5 feet mean sea level. Vegetative communities range from open water in the channel proper to maidencane marsh, broadleaf marsh, iris ponds, wax myrtle shrub, unimproved pasture, improved pasture, sugarcane, oak-cabbage palm hammocks, and disturbed communities. The National Wetland Inventory project of the Fish and Wildlife Service classes the wetlands as palustrine-narrowleaved persistent-seasonal water and ditched. They have described about 950 acres of this type below the 20 foot contour line. The levee alignment will pass through most of the different communities in the slough, but will impact the pasture and shrub communities to a greater extent than the wetland communities. Overall, the levee and borrow canal will eliminate about 110 acres of existing habitat.

A total of 36 species of birds including a pair of bald eagles and a caracara were observed on site. Wild hog, whitetail deer, and turkey were observed as well as sign from raccoon, rabbits, and armadillo.

Fish and wildlife benefits are very similar with and without the project. Without the project, the site will be subjected to higher water levels for longer periods of time as a result of the higher regulation schedule on Lake Okeechobee. This increased regulation schedule will lengthen the hydroperiod in the slough and promote the growth of hydric or aquatic plants. This will increase the area of slough allowing more establishment of wetland communities and thereby benefit the fish and wildlife resources of the area.

With the proposed Plan G, the slough will also be subjected to extended hydroperiods as the levels in the slough will still be controlled by the water level in the lake. The main difference in with and without projects is that with the project the improved land in the slough area will be protected and a channel leading to the Caloosahatchee River will provide both control and drawdown capabilities for the slough.

Plan G includes the protection of Nicodemus Slough as a functioning system rather than converting it to another improved area. This is in line with the recommendations of the Fish and Wildlife Service in previous correspondence. The details of the plan are not sufficient at this time to make recommendations for specific construction but there is a need to address endangered and threatened species, operation of Culvert "A", water levels in the Levee 41 borrow ditch, construction of Levee 51 borrow ditch, and placement of plugs and/or weirs in the Levee 51 borrow ditch.

Endangered species that occur or possibly occur in the project area include: West Indian manatee, everglade kite, Southern bald eagle, Florida panther, and red-cockaded woodpecker. Federally listed threatened species include the American alligator and the Eastern Indigo snake. Action to increase the hydroperiod should benefit the majority of these species with the Eastern Indigo snake possibly adversely impacted by higher water levels. This does not constitute compliance with Section 7 consultation but is provided as a planning aid.

Culvert "A" must only be operated to prevent damage to the lands above the easement line. Operation should be so that the area will be inundated for short periods of time during abnormally high water regionwide, and not so that the water level in the slough will be rapidly drawn down to excessively low levels to prevent short period inundation. The lower limit of the operation schedule for the culvert must not be lower than 15.5 feet mean sea level.

The borrow ditch east of S.R. 78 must be plugged at Culvert 5 to prevent drainage of the slough by this means. This ditch was used in April 1980 to lower the water level in the slough and succeeded in removing in excess of two feet of water from the area.

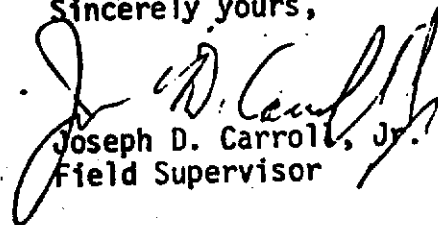
If the L-51 borrow ditch is to be placed on the north and west sides of the levee, then plugs or weirs must be placed in the ditch to prevent its use as a drainage ditch for the perched wetlands in the upper reaches of the slough. These plugs should be placed at least at every two-foot contour interval and have a top elevation equal to or higher than the adjacent land elevation. The plugs must be stabilized to prevent being washed out.

Mitigation should be performed to offset the losses to fish and wildlife resources as a result of levee construction. This should include the following:

1. The removal of the spoil piles adjacent to the slough below the proposed easement purchase by pushing the piles back into the channel, or by removal to construct L-51, or to other upland sites.
2. The removal of berms and roads around the borrow pits in the Fisheating Creek area that were used to raise S.R. 78. Removal should be to or below adjoining marsh elevations.
3. The bottom of the borrow canal for levee construction be irregular in centerline section ranging from about minus 1 foot below the high water surface to a depth necessary to obtain adequate spoil. The shallow water portion of the canal to occur every 200 feet and be 50-feet long.
4. The southern toe of L-51 coincide with the southern toe of the berm on the north side of the improved lands (where their alignment coincides).

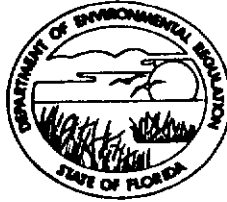
We appreciate the opportunity to comment on this project and are in support of this preliminary plan over previously proposed plans. We will provide additional and more specific comments when the final plan is made more formal.

Sincerely yours,


Joseph D. Carroll, Jr.
Field Supervisor

cc:
AO, Jacksonville, Fla.

TWIN TOWERS OFFICE BUILDING
1000 BLAIR STONE ROAD
LAHASSEE, FLORIDA 32301



BOB GRAHAM
GOVERNOR

JACOB D. VARN
SECRETARY

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

July 18, 1980

Mr. John R. Maloy
Executive Director
South Florida Water
Management District
Post Office Drawer V
West Palm Beach, Florida 33402

Dear Jack:

Staff of this Department have been evaluating the District's proposals for the Nicodemus Slough area as outlined in your letter of April 9, 1980 to the Corps. We have no problem with the proposed new alignment for the east-west levee (L-51) and support the concept of a protective levee for SR-78. There are, however, two issues that we would like to see addressed further.

First, the revised plan now suggests that Canal 19 be extended due north rather than enlarging the L-41 and L-42 borrow canals. Culvert A would be relocated to the intersection of C-19 and the new east-west levee (L-51). Noting the flow pattern of water in the Slough, this location of Culvert A would tend to shorten the flow through the Slough and would remove several hundred acres of potential wetlands as a nutrient uptake area, thus negating some potential water quality benefits.

We appreciate the fact that the C-19 extension alignment avoids the open dumping area adjacent to L-41. However, we would like to suggest that the new borrow canal south of L-51 be sized so as to carry the flow westerly to the C-19 extension and that Culvert A be retained in its original location at the low end of the slough. This would appear feasible as this is the area which would require the greatest amount of excavation to build up L-51 to its required grade. Such a location for Culvert A would allow potential utilization of the total marsh area for water quality improvements.

Mr. John R. Maloy
Page Two
July 18, 1980

A second concern is the placing of the borrow canal from Point "Z" to the western end of L-51. The new alignment calls for placement of this borrow canal west of the levee. The primary concern here is the potential for overdrainage of these undeveloped lands adjacent to the borrow canal. As the borrow canals are usually placed on the side of the levee that water levels are being managed, it would seem more appropriate to locate the borrow canal on the interior side of L-51. In this manner, the borrow canals would remain under the management and control of the water management district for operation and maintenance purposes.

An option, if the borrow canal is left as the landowner has requested on the west side of the levee, would be to make the canal discontinuous as is proposed along SR-78. This would help negate the potential for overdrainage. Another option would be to leave a temporary plug in the borrow canal at Point "Z" until such time as internal management programs can be developed by the landowner and approved by the water management district. In no case should the levee (L-51) be breached to connect the inside and outside borrow canals.

If it would be of benefit, we can arrange for our staff to discuss these concerns and permitting requirements with you and representatives of the Corps. We appreciate the opportunity to provide input and are pleased to see real progress being made on this project.

Sincerely,

Jacob D. Varn
Secretary

JDV/bs

cc: Mr. James L. Garland



South Florida Water Management District

Post Office Box V 3301 Gun Club Road
West Palm Beach, Florida 33402
Telephone (305) 636-8800
Florida WATS Line 1-800-432-2045

Mr. Garland-Corps

John R. Maloy, Executive Director

IN REPLY REFER TO: 9-DIS-NS

July 23, 1980

Mr. Jacob D. Varn, Secretary
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Jake:

This is in reference to the Nicodemus Slough project and your letter of July 18, 1980. As discussed by telephone with your staff, we feel that the concern with the location of Culvert "A", while understandable, does not warrant modifying the location. Engineering design considerations are a factor, as is the frequency of use of Culvert "A".

The operational criteria for Culvert "A" indicates that it will be operated to avoid exceeding elevation 18.0 in the storage pool. Consequently, the entire area below elevation 18.0 will be ponded during any operation and marsh flow benefits will be marginal, at best. These stages should be encountered infrequently.

If we place Culvert "A" at the original location and make an abrupt turn on the downstream end rather than letting the flow continue in a direct line, we will have to armor-plate the outfall to dissipate the kinetic energy from several feet of head loss and a 90 degree turn. This will be expensive to construct and will remain a potential maintenance problem.

We have no problem with your suggestion to place plugs to prevent over-drainage in the western reach of the L-51 borrow. There is an indication that water may be trapped in an area north of the railroad and west of L-51. The continuous borrow is required to alleviate this situation, but plugs can and should be placed to prevent over-drainage.

If additional information on this matter is needed, please let me know. Your input and review is appreciated.

Yours very truly,

JOHN R. MALOY
Executive Director

JRM:rhg

cc: Mr. James L. Garland
C of E, Jacksonville

SAJEN-RH

4 August 1980

Mr. Jacob D. Varn, Secretary
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Dear Mr. Varn:

This letter addresses issues raised in recent correspondence between your agency and South Florida Water Management District concerning possible design changes for Plan G of the Nicodemus Slough Project.

In order to insure full coordination of conceptual changes considered for Plan G, a brief summary of recent correspondence is in order. An inter-agency field trip was conducted at Nicodemus Slough on 25 March 1980. As a result of that trip, SFWMD, in a letter dated 9 April 1980, requested consideration of seven refinements to Plan G. A copy of this letter is inclosed for convenient reference. Your letter dated 18 July 1980 (inclosure 2) provided general concurrence with most of the refinements requested by SFWMD with the exception of the proposed relocation of Culvert "A" about 1 mile to the west. Your objection to moving the structure site was based on the opinion that this would shorten the flow through the slough and remove several hundred acres of potential wetlands that could serve as a nutrient uptake area, thus negating some potential water quality benefits. Inclosure 3 is a letter from SFWMD dated 23 July 1980 in response to your letter of 18 July 1980 presenting some engineering problems associated with leaving Culvert "A" at the originally considered location and presenting their opinion that marsh flow benefits would be marginal, at best.

We have made a review of the comments made by both agencies and feel that the moving of Culvert "A" one mile to the west would not remove several hundred acres of potential wetlands. The affected acreage and storage in the slough with the water surface at 18.0 ft., m.s.l., would be the same

Inc. 5

SAJEN-RH
Mr. Jacob D. Varn

4 August 1980

with either culvert location. While the relocation of Culvert "A" may shorten the travel time of runoff from the western portion of the slough, it would increase the travel time for runoff from the northeast portion. During periods of heavy rainfall when stages in the slough could exceed 18.0 feet, the area would drain at the same rate regardless which location is used for Culvert "A." From the hydraulic viewpoint, the new culvert location would reduce the length of canal improvement from the slough to S-47B, which would allow a steeper energy gradient for the canal design which would result in a smaller required conveyance in the channel section.

It is our opinion that the new proposed location of Culvert "A" would result in better performance, at less cost, without causing a detrimental effect on the environmental considerations of this project. Accordingly, and in order to expedite work on the General Design Memorandum, we will continue design work on Plan G considering this and the previous refinements requested by SFWMD. We will also include in our design effort your recommendation that a plug be placed in the western reach of the L-51 borrow canal to prevent overdrainage.

Sincerely,

3 Incl

1. SFWMD ltr dtd 9 Apr 80
2. DER ltr dtd 18 Jul 80
3. SFWMD ltr dtd 23 Jul 80

JAMES L. GARLAND
Chief, Engineering Division

Hashtak/SAJEN-RH/ehm/2208 8/1/80

Salem/SAJEN-R

Saunders/SAJEN-E

Barbot/SAJEN-A

Garland/SAJEN

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301



BOB GRAHAM
GOVERNOR
JACOB D. VARN
SECRETARY

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

August 29, 1980

Mr. John R. Maloy
Executive Director
South Florida Water
Management District
Post Office Box V
West Palm Beach, Florida 33402

Dear Jack:

After reviewing your letter of July 23 concerning the Nicodemus Slough Plan "G" and additional information provided by the Corps of Engineers in their letter of August 4, we are in basic agreement that Culvert "A" can be placed at the intersection of the L-41 extension and the new levee (L-51) without affecting the water quality benefits of the plan. We would request that the operational criteria, as agreed upon in our letter of October 16, 1979, be carefully spelled out in the GDM and EIS documents so as to avoid any misunderstanding of the basic purpose of the culvert when the State Clearinghouse agencies perform their final review of those documents.

We appreciate the spirit of cooperation that has been evident throughout the development of this plan and hope that further delays can be avoided.

Sincerely,

Jacob D. Varn
Secretary

JDV/bs

cc: Chuck Littlejohn
Al Bishop
James L. Garland ✓

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301



BOB GRAHAM
GOVERNOR
JACOB D. VARN
SECRETARY

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

August 29, 1980

Mr. James L. Garland
Chief
Engineering Division
Jacksonville District
U. S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32201

Dear Jim:

We have your letter of August 4 regarding the Nicodemus Slough Plan "G" and are in basic agreement that Culvert "A" can be placed at the intersection of the L-41 extension and the new levee (L-51) without adversely affecting the water quality or quantity parameters that made Plan "G" an acceptable alternative. We would request that the operational criteria as outlined in a letter dated October 16, 1979, from Chuck Littlejohn to you, be incorporated in the GDM and EIS documents so as to avoid any misunderstanding of the purpose of Culvert "A" when the State Clearinghouse agencies carry out their review of these documents.

We appreciate the cooperation extended by you and your staff in the development of this plan.

Sincerely,

Jacob D. Varn
Secretary

JDV/bs

cc: Chuck Littlejohn
Al Bishop
Jack Maloy

APPENDIX 2
Pearce Property Alternatives

ANALYSIS OF OPTIONS FOR PEARCE PROPERTY

It has been suggested that it might be more cost effective to dike off private property in the Northeast part of Nicodemus Slough and provide pumping facilities to remove seepage and storm runoff than it would be to purchase the property and relocate its occupants. Further investigation casts some doubt as to the validity of such an assumption. Table 8 on page 24 of Part II, Supplement 19-GDM-Nicodemus Slough sets forth the following information regarding the proposed pumping station at the Northeast Corner of Nicodemus Slough:

Purpose: Flood Control
Design Conditions:
Discharge-- 6 cfs
Normal Intake WSE-- 14 feet NGVD
Optimum Intake WSE--
Discharge WSE-- 16-20 feet
Optimum WSE -- 13 feet
Average Annual Volume-- 10 acre-ft.
Protection Elevation-- 24 feet

Upon close examination of the problem it appears that the 6 cfs discharge would represent 11.9 acre feet which equates to approximately 6 inches per day of runoff removal from 22.6 acre tract which is comprised of the privately owned parcel together with that portion of State Road 78 north of the bridge at Culvert #5 and south of LD-3 all of which would be girded by a common dike whose total perimeter would be approximately one mile (for all practical purposes). The water surface elevation of the area surrounding this parcel of private land and segment of State Road 78 will be at elevation + 17.5 at times when the WSE within the 22.6 acre subject area will be at elevation 13.0 feet NGVD. This will subtend a head across the perimeter dike of 4.5 feet and will induce a seepage of 8 to 10 cfs (for design purposes say 9 cfs). Extreme high water in Lake Okeechobee would conceivably go as high as 20 feet NGVD and in the past the ordinary high water experienced on this tract (according to best information available) is in the order of 15.5 feet NGVD thus corroborating the design head of 4.5 feet.

For the purpose of comparison, four cases are considered as follows:

CASE I. Isolate private property by constructing a dike on the West and South lines of same together with a dike running south from said property along the west side of that portion of State Road 78 between LD-3 and the bridge at Culvert No. 5. This enables us to drain storm water and seepage from this reach of State Road 78 without raising it and this solution entails placing a cross road culvert upstream of the pump station which would be constructed on the East side of State Road 78 between the highway and LD-3 north of Culvert #5.

Mob and Demob	\$ 4,000
100' - 48" BCCMP	120,000
Pumping Station	
1-16" pump(w/30hp elect.)	14,400
2-16" pumps(w/40hp elect.)	29,950
Motor Control Center	16,000
Generator	10,700
Building	15,000
32"-48" BCCMP w/48" gate	14,000
Steel Sheet Piling 90T at 700 per ton	63,000
Transport and install pumps and generator	22,500
E/W 40,000cy at 3.00/cy	120,000
Electrical (Power Source	6,000

	\$435,550
+ 20% B.P. and Oh	87,110

Total Contract Price	\$522,660
	(call \$525,000)

This would permit the continued use of the above mentioned segment of State Road 78 without raising it.

CASE II. Similar to Case I except that State Road 78 would not be protected and the area diked off would be only the privately owned property plus a peripheral strip appended to the south and west upon which the Dike and "inside toe ditch" would be constructed. This would result in a smaller pumping station and less annual costs and would eliminate the cross road culvert.

The pumping station would be located at the Southeast corner of the property.

Mob and DeMob	\$ 4,000
3 - 12" Elect. pumps	38,000
1 - 50 KW Diesel Generator	9,000
1 - Control Panel and Switchgear	15,000
1 - Building (Pre-Eng)	15,000
1 - 32"x48" BCCMP w/gate	14,000
80 Ton Steel Sheet Piling at \$700/T	56,000
Labor and Transportation mat'ls	20,000
E/W - 3500cy at \$4.00 /cy	14,000
Emb.(perim.dike)20,000cy at \$3/cy	60,000
Electric Power Service	6,000

Sub-Total	\$191,000
20% BP and OH	38,200
Total	\$229,200
	(call \$230,000)

As an adjunct to Case II, State Road 78 between LD-3 and Culvert #5 must be raised to elevation 24.0 NGVD. The cost for this construction is as follows:

Preliminary cost to raise 1700 Lin ft. of State Road 78 (between bridge at Culvert #5 and LD-3).

Assuming that this segment would be rebuilt to elevation + 24.0.

Mob and Demob	\$ 20,000
32,000cy roadway emb. at \$3.50/cy	112,000
4699sy 10" limerock base at \$3.50/sy	16,100
4600sy 2-1/2 a/c(type S-1) at \$6.00/sy	27,600
4600sy SC-2 friction crse at \$1.00/sy	4,600
Stabilized shoulders	6,400
Striping and Signage	900
Traffic Control	30,000
Subtotal	\$217,600
+ 20% BP and OH	43,520
Total	\$261,120
	(call \$260,000)

CASE III. Purchase the property outright and relocate the occupants. Protection of SR 78 would be provided by a levee on the west side and a small 6 cfs pump station.

Costs:

Purchase property and relocate occupants	\$200,000
Levee	54,000
Pump Station	140,000
Total	\$394,000

CASE IV. Purchase the property outright and relocate the occupants. Protection of SR 78 would be provided by a levee on the west side and by raising the road to elevation 24.0' NGVD.

Purchase and relocation	\$200,000
Levee	54,000
Raise SR 78	260,000
Total	\$514,000

Cost comparison of each of the four cases are as follows:

CASE I	\$525,000
CASE II	\$230,000
Cost to Raise SR 78	\$260,000
Total	\$490,000
CASE III	\$394,000
CASE IV	\$514,000

Based on long term operation and maintenance considerations for the small pump station in Cases I, II, and III, it was determined that Case IV should be the alternative to implement.

MEMORANDUM

TO: Philip B. Hubbard, Director, Real Estate Division
FROM: A. J. Dubois, Review Appraiser
DATE: December 19, 1985
SUBJECT: D. L. Pearce property, Glades County

In compliance with your request, I have made an off-site inspection of the subject property identified below for the purpose of determining a preliminary cost of acquisition for project purposes.
The property is identified as follows:

OWNER: D. L. Pearce
Route 6, Box 795
Okeechobee, FL 33472

Description: Portion of Section 9, Township 41 South,
Range 32 East, Glades County, FL (TM 25-R)

Area: 10 Acres +

Location: West side of State Road 78 at intersection of
Levee Dike 3

Zoning: RM - Mixed Residential

Strap: A-09-41-32-A0-0030.0000

I have met at length with personnel of the nearby Lakeport area who appear to be familiar with the local market and conditions concerning the current real estate activity in the area of subject.

Sales activity in this general area is very limited at this time and appears to be affected by what the local perception is of the environmental regulations that are currently under consideration for development of properties to other than agricultural uses.

During my investigation, I have met with the Property Appraiser and members of the Building and Zoning Department of Glades County.

Based on the above interviews and past experiences in this area for project purposes, I have deduced that on December 18, 1985 the subject property probably has a value in the range of \$150,000 to \$200,000.

Firm acquisition plans would require a current appraisal with attending caveats.

A. J. Dubois
Review Appraiser

Appendix 3
Drilling records



Ardaman & Associates, Inc.

Consulting Engineers in Soil Mechanics,
Foundations, and Materials Testing

June 14, 1985
File No. 85-2775

RECEIVED
ENGINEERING & CONSTRUCTION
DIVISION

JUN 15 '85

Mr. Zan Kugler
South Florida Water Management District
P.O. Box V
West Palm Beach, FL 33402

Test Borings
Nicodemus Slough Project
SFWMD P.O. No. 85-3369

DESIGN _____
FACILITIES _____
SURVEY & MAPPING _____
R/W PERMITS _____
OTHER _____
OTHER _____
FILE _____

We have redrilled Borings CB-1B, CB-2B, and CB-8B at the correct locations. Logs for these borings are attached. These logs supersede all previous logs for these three borings.

A revised log for CB-11 is also attached. At the time this boring was made, the canal was being cleaned and the staked location was not accessible due to the spoil bank. The co-ordinates of the relocated boring were estimated by measuring southward from Boring CB-9B. If the CB-9B coordinates provided by SFWMD are correct, we suspect that the coordinates provided for CB-12B and CB-13B may be incorrect.

A third adjustment to our logs should be made for Borings CB-23A through CB-26A. These four borings are adjacent the canal at US 27. We estimate that groundwater at these locations is three to four feet below the ground surface.

The jar samples for all the borings, including the three holes that we redrilled, have been delivered to your office.

This completes the work under our contract with SFWMD on this project. Our invoice for the work is enclosed. The final cost is less than the purchase order price due to 80 feet of borehole not drilled. This includes 60 feet where rock was encountered and the borings were stopped short of the depth requested. The other 20 feet are due to the substitution of two 30-foot borings where 40-foot borings had been budgeted.

We appreciate the opportunity to bid for and perform this work for SFWMD. Please contact us any time you may be able to assist you, and please call if you have any questions regarding our work on this project.

ARDAMAN & ASSOCIATES, INC.


William Bailey
Project Engineer

WB/ca
6440 Garden Road, P.O. Box 10268, Riviera Beach, Florida 33404 Phone 842-7433
Offices in: Bartow / Bradenton / Cocoa / Fort Myers / Miami / Orlando / Riviera Beach / Sarasota / St. Marys / Tallahassee

Northing 941001 Easting 459903 DATE DRILLED June 10, 1985 GROUND SURFACE ELEV 17.22 WATER TABLE DEPTH 4'± DATE 6/10/85	CLIENT South Florida Water Management District PROJECT Nicodemus Slough (85-3369) Glades County, Florida DRILL CREW D. Groover, K. Secrist
--	---

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	DEPTH, FT
	1/2	5	1	SM	Med brown very silty fine SAND w/roots	
	3/3		2	SM	Light brown very silty fine SAND	
5	1/2	6	3	SM	Yellowish brown silty fine SAND with shell fragments	5
10	3/2	5	4	SM	Light gray silty very fine SAND	10
15	2/3	6	5		Med gray very silty very fine SAND, few shells	15
20	2/3	7	6	ML SM	Dark gray SILT and very fine SAND, trace of decomposed shells	20
25	3/4	7	7	ML	Dark gray slightly clayey SILT with many shell fragments	25
30	2/3	7	8		Same	30
	4/5				Boring completed at depth 30 feet.	
35						35
40						40

Supersedes all logs dated previously

APPROVED BY: _____ DATE 6/13/85 FILE NO. 2775 BORING NO. CB-1B

CHECKED BY W Bailey SHEET 1 OF 1

Northing 940390
 Easting 459899
 DATE DRILLED June 11, 1985
 GROUND SURFACE ELEV not given
 WATER TABLE DEPTH 4' DATE 6/11/85

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	DEPTH, FT
	2/3	5	1	SM	Dark brown very silty fine SAND with	
	2/3		2	SM	roots and organics	
					Dark brown silty fine SAND	
5	4/4	8	3	SM	Med grayish brown silty fine SAND with cemented sand and shell fragments	5
	4/4					
10	3/1	3	4	SM	Light gray very silty very fine SAND with shell fragments	10
	2/2					
15	3/2	4	5		Same	15
	2/3					
20	2/3	6	6	ML SM	Dark gray SILT and very fine SAND	20
	3/3					
25	3/3	5	7	ML SM	Med gray SILT with shell fragments, and layers of darker gray silty very fine SAND	25
	2/3					
30	2/3	7	8	ML SM	Dark gray SILT and very fine SAND, traces of shell fragments	30
	4/4					
					Boring completed at depth 30 feet	
35						35
40						40

APPROVED BY:

Supersedes all CB-2B logs dated previously
 DATE 6/13/85 FILE NO. 2775 BORING NO. CB-2B
 CHECKED BY *W Bailey* SHEET 1 OF 1

Northing 928676 Easting 459822 DATE DRILLED June 10, 1985 GROUND SURFACE ELEV 15.99 WATER TABLE DEPTH 2'5" DATE 6/10/85	CLIENT South Florida Water Management District PROJECT Nicodemus Slough (85-3369) Glades County, Florida DRILL CREW D. Groover, K. Secrist
---	---

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	DEPTH, FT
	2/3 3/3	6	1	SP	Dark brown slightly silty fine SAND w/	
				SM	with roots	
			2		Light brown fine SAND	
5	5/5 3/3	8	3	SM	Med gray silty fine SAND and SHELL	5
10	3/4 2/2	6	4	SM	Light gray very silty fine SAND with cemented sand and shell	10
15	3/2 3/5	5	5	ML SM	Med gray SILT and very fine SAND with shell fragments	15
20	2/3 2/3	5	6	SM	Dark gray silty very fine SAND, traces of shell fragments	20
25	3/5 3/6	8	7	ML SM	Dark gray SILT and very fine SAND with much shell	25
30	2/3 4/3	7	8		Same, slightly clayey	30
					Boring completed at depth 30 feet	
35						35
40						40

APPROVED BY:

Supersedes all CB-8B logs dated previously

DATE 6/13/85 FILE NO. 2775 BORING NO. CB-8B

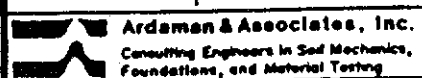
CHECKED BY *W Bailey* SHEET 1 OF 1

NORTHING 924680±50	CLIENT South Florida Water Management District
EASTING 459833±5	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-29-85	Glades County, Florida
GROUND SURFACE ELEV 17.28	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 5'0" DATE 5-29-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/3 5/6	8	1	SP	Brown fine SAND with surface organics		
			2	SP	Same, no organics		
5	11/8 7/7	15	3	SP	Tan fine SAND with medium shell fragments		5
10	10/10 11/14	21	4	SP	Light gray fine SAND with very fine shell fragments		10
15	11/12 13/13	25	5	SP	Same, some cemented sand fragments		15
20	3/4 4/4	8	6	SM	Gray fine SAND and SILT with traces of shell fragments		20
25	2/3 4/4	7	7	SM	Same, more shell fragments		25
30	3/2 3/4	5	8	SM	Same, fewer shell fragments		30
					Boring completed at depth 30 feet		
					Note This boring relocated to clear spoil bank from channel cleaning. Boring was moved south only a few hundred feet. Coordinates for relocated boring estimated based on the assumption that the coordinates for CB-9B provided by SFWMD are correct. Coordinates for CB-12B and CB-13B appear to be incorrect.		35
40							40

APPROVED BY: *[Signature]*

revised 6/10/85



DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-118
CHECKED BY V. Finizio SHEET 1 OF 1

SOUTH FLORIDA
WATER MANAGEMENT DISTRICT

3301 GUN CLUB ROAD - WEST PALM BEACH, FLORIDA 33402 - PHONE 686-8800

TO: RED RODGERS
CHIEF: ENGR. DESIGN SECTION

SUBJECT:
NICODEMUS SLOUGH
CORE BORINGS

FROM:
M. SPEER

DATE:
6-6-85

MESSAGE: PURSUANT TO OUR DISCUSSION THIS MORNING, I'VE
ATTACHED THE REVISED LOCATION COORDINATES FOR CORE
BORINGS CB-17A & CB-18A.

Zan, it would be good policy for us to
advise Ardaman & Assocs of these
corrections so that they can correct
their file copies — otherwise later
problems could evolve. Red

SIGNED

M. Speer

REPLY:

DATE

SIGNED

(SCL RAILROAD)

6-6-85 (VFS)

NORTHING <u>917424</u>	CLIENT <u>South Florida Water Management District</u>
EASTING <u>454690</u>	PROJECT <u>Nicodemus Slough (85-3369)</u>
DATE DRILLED <u>5-21-85</u>	<u>Glades County, Florida</u>
GROUND SURFACE ELEV <u>21.74</u>	DRILL CREW <u>D. Groover, K. Secrist</u>
WATER TABLE DEPTH <u>10'0"</u> DATE <u>5-21-85</u>	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	6/10	18	1	SP	Brown fine SAND with rock and surface organics		
	8/6		2				
	7/8	15		SP	Brown fine SAND with traces of silt		5
	7/6						
5							
10	10/12	24	3	SP	Tan slightly silty calcareous fine SAND and cemented sand fragments		10
	12/12			SM			
15	3/2	3	4	SP	Light gray slightly silty, very fine SAND with traces of shell fragments		15
	1/2						
20	5/3	9	5	SP	Same, more shells		20
	6/6						
25	5/6	13	6	SP	Gray fine SAND and shell fragments		25
	7/6						
30	5/5	11	7	SP	Brown fine SAND		30
	6/5						
35	2/1	3	8	SP	Gray medium to fine SAND and fine shell fragments		35
	2/2						
40			9	ML	Green clayey SILT with shell fragments		40
					Boring completed at depth 40 feet		

APPROVED BY:

*Robert R.*DATE 5-31-85 FILE NO. 85-2775 BORING NO. CB-17ACHECKED BY V. Fingier SHEET 1 OF 1

(S.C.L. RAILROAD)

6-4-07 MR

NORTHING <u>919636</u>	<u>917453</u>	CLIENT South Florida Water Management District PROJECT Nicodemus Slough (85-3369) Glades County, Florida DRILL CREW <u>D. Groover, K. Secrist</u>
EASTING <u>454630</u>	<u>454625</u>	
DATE DRILLED <u>5-22-85</u>		
GROUND SURFACE ELEV <u>20.23</u>		
WATER TABLE DEPTH <u>10'0"</u> DATE <u>5-22-85</u>		

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
4/5	9	1	SP	Brown fine SAND with traces of tan calcareous silty fine sand nodules			5
4/6	7	2	SP	Same			10
3/3							15
4/3							20
5/4	11	3	SP	Tan calcareous slightly silty fine SAND with cemented sand fragments			25
7/6							30
2/4	7	4	SM	Tan calcareous silty fine SAND with medium to coarse shell fragments			35
3/3							40
6/7	17	5	SP	Grayish tan fine SAND with some fine shell fragments			
10/10							
6/5	10	6	SP	Tan to gray SAND and SHELLS with traces of silt			
5/5							
7/8	19	7	SP	Same			
11/9							
3/2	4	8	ML	Gray SILT with traces of shell fragments			
2/2							
1/0	1	9	ML	Same			
0/1							
					Boring completed at depth 40 feet		

APPROVED BY: *RR*DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-18ACHECKED BY *V. L. L. L.* SHEET 1 OF 1

OPTION: LOCATE BY ANGLE

1-LIST POINTS

2-LIST UNUSED PTS.

3-DELETE BLOCK OF PTS

4-ADD POINT

5-DELETE POINT

6-RENUMBER POINT

7-DUPL. BLOCK OF PTS

8-CHANGE POINT

9-SET ELEVATION

FROM POINT #? 11

ANGLE: 237.344

DISTANCE: 183.15

S 57 43 09.3 W

NORTHING: 917452.6509

EASTING: 454625.3781

POINT #: 904

DESC: CB-18A

OPTION? ____

OPTION: LOCATE BY ANGLE

26-AREA / PARAL. SIDE

27-AREA / HINGED SIDE

28-CURVE DESIGN

29-UNIVERSAL CURVE

30-LINE SEGMENTS

31-CURVE SEGMENTS

32-TANG. TO A CIRCLE

33-TANG. TO 2 CIRCLES

34-ST. INTERSECTIONS

FROM POINT #? 11

ANGLE: 215.2634

DISTANCE: 155.79

S 35 35 03.3 W

NORTHING: 917423.7676

EASTING: 454689.5666

POINT #: 903

DESC: CB-17A

OPTION? ____

FORM G4
Rev. 12/81

SOUTH FLORIDA
WATER MANAGEMENT DISTRICT

3301 GUN CLUB ROAD - WEST PALM BEACH, FLORIDA 33402 - PHONE 686-8800

TO:

Hans Itho

SUBJECT:

Nicodemus Slough
Test Borings

FROM:

Zan Kuyler, P.E., Design Section

DATE:

6/5/85

MESSAGE:

Forwarded for your use are the boring logs for the subject project. The drawings of the boring locations used by survey and given to Ardaman for information have been stored in the Engineering Section's drawing file. (H. Dr. Carl Zeig has the survey data.)

SIGNED

Zan Kuyler

REPLY:

DATE

SIGNED

SOUTH FLORIDA
WATER MANAGEMENT DISTRICT

3301 GUN CLUB ROAD - WEST PALM BEACH, FLORIDA 33402 - PHONE 686-8800

File

TO: R.E. Rodgers, P.E., Chief, Design Section
Mated Red

SUBJECT: Nicodemus Slough;
Test Borings

FROM: Zan Kugler, P.E., Design Engineer

DATE: 6/4/85

MESSAGE: The subject work is complete and Ardaman has provided all logs and samples as required by the Contract. The samples will be stored upon Lee Halbin's return from leave. The boring logs (3 copies) are attached, one copy has been included in the project file. The drawings of the boring locations used by survey and given to Ardaman for information have been stored in the Engineering Section's drawing file for future use.

Several holes did not reach the required depth due to rock :

SIGNED

Zan Kugler

REPLY:

DATE

HOLE #	REQ'D. DEPTH	ACTUAL	UNIT COST	DEDUCT
CB-28A	30	15	5.83	87.45
CB-29A	30	24	5.83	34.98
CB-31A	40	31	6.00	54.-
CB-32A	40	26	6.00	84.-
CB-34A	30	16.5	5.83	78.71

(-) 339.14

TOTAL CONTRACT AMT. 10595.-

SIGNED

PAY

10255.86

ARDAMAN & ASSOCIATES, INC.
P. O. Box 10268
Riviera Beach, Florida 33404

LETTER OF TRANSMITTAL

TO South Florida Water Management District
P. O. Box V
West Palm Beach, Florida

DATE	6/3/85	JOB NO.	85-2775
ATTENTION	Mr. Zan Kugler		
RE	Nicodemus Slough Project		

GENTLEMEN:

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:
☐ Shop drawings ☐ Prints ☐ Plans ☒ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
4	6/3/85		Soil Boring Logs and Hand-delivered samples for the remainder of the Nicodemus Slough Project.
			CB-2A thru CB-6A
			CB-16A thru CB-17A
			CB-32A thru CB-33A
			CB-1B thru CB-13B

THESE ARE TRANSMITTED as checked below:

- | | | |
|--|---|---|
| <input type="checkbox"/> For approval | <input type="checkbox"/> Approved as submitted | <input type="checkbox"/> Resubmit _____ copies for approval |
| <input checked="" type="checkbox"/> For your use | <input type="checkbox"/> Approved as noted | <input type="checkbox"/> Submit _____ copies for distribution |
| <input type="checkbox"/> As requested | <input type="checkbox"/> Returned for corrections | <input type="checkbox"/> Return _____ corrected prints |
| <input type="checkbox"/> For review and comment | <input type="checkbox"/> _____ | |
| <input type="checkbox"/> FOR BIDS DUE _____ 19 _____ | <input type="checkbox"/> PRINTS RETURNED AFTER LOAN TO US | |

REMARKS

Copy TO File #85-2775

SIGNED Vincent A. Finizio

ARDAMAN & ASSOCIATES, INC.
P. O. Box 10268
Riviera Beach, Florida 33404

LETTER OF TRANSMITTAL

DATE	5/29/85	JOB NO	85-2775
ATTENTION			
Mr. Zan Kugler			
RE			
Nicodemus Slough Project			

TO South Florida Water Management District
P.O. Box V
West Palm Beach, Florida

GENTLEMEN:

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:
☐ Shop drawings ☐ Prints ☐ Plans ☒ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☒ Partial samples as performed

COPIES	DATE	NO.	DESCRIPTION
4	5/29		Soil borings logs and hand delivered samples
			CB-1A
			CB-7A thru CB-15A
			CB-18A thru CB-31A
			CB-34A

THESE ARE TRANSMITTED as checked below:

- | | | |
|--|---|---|
| <input type="checkbox"/> For approval | <input type="checkbox"/> Approved as submitted | <input type="checkbox"/> Resubmit _____ copies for approval |
| <input checked="" type="checkbox"/> For your use | <input type="checkbox"/> Approved as noted | <input type="checkbox"/> Submit _____ copies for distribution |
| <input type="checkbox"/> As requested | <input type="checkbox"/> Returned for corrections | <input type="checkbox"/> Return _____ corrected prints |
| <input type="checkbox"/> For review and comment | <input type="checkbox"/> _____ | |
| <input type="checkbox"/> FOR BIDS DUE _____ 19 _____ <input type="checkbox"/> PRINTS RETURNED AFTER LOAN TO US | | |

REMARKS At time of boring we could not obtain groundwater elevation for boring
locations CB-23A thru CB-26A and CB-28A

Please contact our project engineer, Mr. Clark Bridgman regarding alternative
measures for determining groundwater data at the previously stated locations.
Telephone: (305) 842-7557
842-7561

COPY TO File # 85-2775 Ardaman & Associates, Inc.

SIGNED: Vincent A. Finizio

NORTHING 933742	CLIENT South Florida Water Management District
EASTING 454426	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-24-85	Glades County, Florida
GROUND SURFACE ELEV 17.74	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 3'0" DATE 5-24-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	1/2	4	1	SM	Dark brown slightly silty fine SAND with fibrous surface organics (OL)		
	2/2		2				
5	8/7	14	3	SP	Tan to brown mottled fine SAND		5
	7/7			SP	Same, traces of silt		
10	3/3	6	4	ML	Light gray green SILT with some very fine sand		10
	3/3						
15	3/2	5	5	SM	Light gray slightly silty calcareous fine SAND with medium shell fragments		15
	3/3						
20	1/2	4	6	SM	Gray silty calcareous fine SAND with traces of shell fragments		20
	2/2						
25	7/8	27	7	SP	Tan medium to fine SAND with traces of shell fragments		25
	19/21						
30	1/32		8	SP	Same		30
	50/4"						
35	50/5"		9	SP	Same		35
40	25/60			SP	Same		40
					Boring completed at depth 40 feet		

APPROVED BY: 

DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-1A

CHECKED BY V. Finizio SHEET 1 OF 1



Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics,
Foundations, and Material Testing

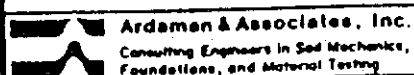
NORTHING 933242	CLIENT South Florida Water Management District
EASTING 454415	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-24-85	Glades County, Florida
GROUND SURFACE ELEV 18.31	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 3'0" DATE 5-24-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	1/2	5	1	SP	Dark gray fine SAND with small roots and organic fine sand		
	3/3		2				
5	5/6	15	3	SP	Light brown fine SAND		5
	9/8				Same		
10	6/6	10	4	SP	Light blue/gray clayey fine SAND		10
	4/3			SC			
15	2/2	5	5	SP	Light blue/gray clayey fine SAND and Shell fragments		15
	3/3						
20	4/4	7	6	CL	Light blue/gray sandy CLAY with traces of decomposed shell fragments		20
25	20/28	64	7	SP	Light gray fine to medium SAND		25
	36/37						
	/36		8	SP	Same		30
30	50/4"				Boring completed at depth 30 feet		30
35							35
40							40

APPROVED BY: *Robert E. ...*

DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-2A

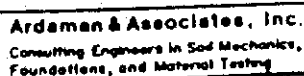
CHECKED BY *V. Finizio* SHEET 1 OF 1



CLIENT South Florida Water Management District
PROJECT Nicodemus Slough (85-3369)
Glades County, Florida
DRILL CREW D. Groover, K. Secrist

APPROVED BY: *J.L.S. R*

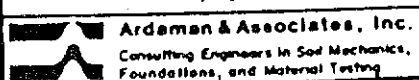
CHECKED BY V. Linizio SHEET 1 OF 1



NORTHING 930999 EASTING 454577 DATE DRILLED 5-24-85 GROUND SURFACE ELEV 18.01 WATER TABLE DEPTH 2'0" DATE 5-24-85	CLIENT South Florida Water Management District PROJECT Nicodemus Slough (85-3369) Glades County, Florida DRILL CREW D. Groover, K. Secrist
---	---

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/3 3/3	6	1	SP	Dark gray fine SAND with small roots and organic fine sand		
5	5/5 6/6	11	2	SP SM	Brown slightly silty to silty fine SAND		5
10	6/4 4/4	8	3	SP	Light brownish gray fine to medium SAND with fine shell fragments		10
15	6/5 6/5	11	4	CL	Blue/gray sandy CLAY with shell fragments		15
20	2/1 1/2	2	5	CL	Blue/gray sandy CLAY		20
25	3/4 3/3	7	6	SP SC	Blue/gray clayey SAND and shell fragments with traces of cemented sand and shell		25
30	16/23 22/22	45	7	SP	Light gray fine to medium SAND		30
					Boring completed at depth 30 feet		

APPROVED BY: *[Signature]*



DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-4A
 CHECKED BY *V. Linigja* SHEET 1 OF 1

NORTHING 930000	CLIENT South Florida Water Management District
EASTING 454570	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-24-85	Glades County, Florida
GROUND SURFACE ELEV 18.48	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 2'0" DATE 5-24-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	1/2 3/3	5	1	SP	Brown fine SAND with traces of silt and surface organics		
5	9/6 4/5	10	2	ML	Tan to orange calcareous SILT with some sand and cemented sand fragments		5
			3	SM	Light gray to orange (mottled) silty fine SAND w/traces cemented sand frag.		
10	2/2 1/2	3	4	SP	Gray slightly silty fine SAND		10
15	3/4 7/3	11	5	ML	Gray SILT with shells and some very fine sand		15
20	2/2 1/3	3	6	ML	Same, fewer shells		20
25	4/1 4/3	5	7	SP	Gray slightly silty fine SAND		25
30	19/24 23/20	47	8	SP	Tan fine SAND		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *[Signature]*

DATE 5-31-85 FILE NO. 85-2775 BORING NO. CB-5A

CHECKED BY *V. Timiz* SHEET 1 OF 1

NORTHING 927260
EASTING 454481
DATE DRILLED 5-23-85

GROUND SURFACE ELEV 19.07
WATER TABLE DEPTH 2'0" DATE 5-23-85

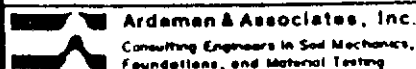
CLIENT South Florida Water Management District

PROJECT Nicodemus Slough (85-3369)
Glades County, Florida

DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	3/4 4/3	8	1	SP	Dark brown fine SAND with traces of silt and organic staining		
5	3/6 9/10	15	2	SP	Tan SAND and medium to coarse shells		5
10	6/5 7/7	12	3	SP	Light gray fine SAND with traces of cemented sand fragments and fine shells		10
15	4/4 4/4	8	4	SP	Light gray fine SAND with shell fragments and a trace of silt		15
20	2/2 2/3	4	5	SP SM	Gray slightly silty fine SAND with some shell fragments		20
25	1/2 1/2	3	6	ML	Gray SILT slightly clayey with shell fragments and very fine sand		25
30	5/6 8/8	14	7	SC	Medium gray slightly clayey fine SAND with traces of shell fragments		30
35	6/6 6/6	12	8		Same		35
40	3/4 6/6	10	9		Same		40
					Boring completed at depth 40 feet		

APPROVED BY: 



DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-8A

CHECKED BY V. Finizio SHEET 1 OF 1

NORTHING 926436
EASTING 454450
DATE DRILLED 5-23-85

GROUND SURFACE ELEV 17.92

WATER TABLE DEPTH 2'0" DATE 5-23-85

CLIENT South Florida Water Management District

PROJECT Nicodemus Slough (85-3369)

Glades County, Florida

DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	17/3 4/4	7	1	SP	Brn. to tan sl. silty fine SAND w/fibrous surface organics		
			2	SP	Tan fine SAND		
5	10/11 12/13	23	3	SP	Tan SAND and medium to coarse shell fragments		5
10	6/8 7/11	15	4	SP	Light brown fine SAND		10
15	5/9 7/5	16	5	SP	Grayish brown fine SAND with shell fragments and trace of silt		15
20	3/2 2/2	4	6	SM	Gray slightly silty fine SAND with medium to coarse shell fragments		20
25	2/3 2/2	5	7	ML	Gray SILT and very fine sand with shell fragments		25
30	20/37 52/	89	8	SP	Gray medium to fine SAND		30
					Boring completed at depth 30 feet		
35							35
40							40

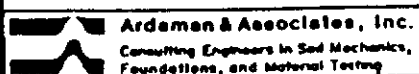
APPROVED BY: 

DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-9A
CHECKED BY V. Tinigio SHEET 1 OF 1

NORTHING 925436	CLIENT South Florida Water Management District
EASTING 454415	
DATE DRILLED 5-22-85	PROJECT Nicodemus Slough (85-3369)
GROUND SURFACE ELEV 17.75	Glades County, Florida
WATER TABLE DEPTH 2'0" DATE 5-22-85	DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	1 1/2	5	1	SM	Dark brown slightly silty fine SAND with fibrous surface organics (OL)		
	3/4		2	SP	Brown fine SAND		
5	3/2	4	3	SP	Brown slightly silty fine SAND with medium to coarse shell fragments		5
	2/5						
10	7/6	12	4	SP	Gray fine SAND with cemented sand and shell fragments		10
	6/4						
15	6/7	14	5	SP	Light gray fine SAND with fine shell fragments		15
	7/10						
20	3/5	13	6	SP	Gray medium to fine SAND		20
	8/9						
25	3/2	4	7	ML	Gray SILT and very fine sand with shell fragments		25
	2/3						
30	2/2	4	8	SP	Gray slightly silty fine to medium SAND with shell fragments		30
	2/2			SM			
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *TJL*



DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-10A

CHECKED BY *V. Finizio* SHEET 1 OF 1

NORTHING 924436	CLIENT South Florida Water Management District
EASTING 454412	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-22-85	Glades County, Florida
GROUND SURFACE ELEV 18.44	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 2'0" DATE 5-22-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
1	1/3	6	1	SP	Dark brown fine SAND with surface organics		
2	3/3		2	SP	Light brown fine SAND		
3	3/4	8	3	SP	Dark brown fine SAND with traces of silt and organic staining		5
4	4/5						
5							
6							
7							
8							
9							
10	7/9	19	4	SP	Tan fine SAND		10
11	10/13						
12							
13							
14							
15	6/8	19	5	SP	Same		15
16	11/11						
17							
18							
19							
20							
21							
22							
23							
24							
25	5/5	10	6	SP	Medium brown fine SAND with traces of silt		20
26	5/5						
27							
28							
29							
30	7/7	13	7	SP	Gray to tan fine SAND		25
31	6/6						
32							
33							
34							
35	3/4	8	8	SM	Gray silty calcareous fine to coarse SAND and shell fragments		30
36	4/4						
37					Boring completed at depth 30 feet		
38							
39							
40							

APPROVED BY: *[Signature]*

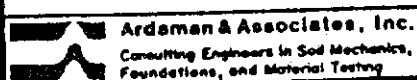
DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-11A

CHECKED BY *[Signature]* SHEET 1 OF 1

NORTHING <u>923437</u>	CLIENT <u>South Florida Water Management District</u>
EASTING <u>454374</u>	PROJECT <u>Nicodemus Slough (85-3369)</u>
DATE DRILLED <u>5-22-85</u>	<u>Glades County, Florida</u>
GROUND SURFACE ELEV <u>18.35</u>	DRILL CREW <u>D. Groover, K. Secrist</u>
WATER TABLE DEPTH <u>1'5"</u> DATE <u>5-22-85</u>	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	1/2	5	1	SP	Dark brown fine SAND w/surface organics		
	3/5		2	SP	Light brown to tan mottled fine SAND		
	3/3	6	3				5
5	3/3			SP	Dark brown fine SAND with traces of silt		
							10
10	4/4	8	4	SC	Dark gray clayey fine SAND		
	4/5						15
15	11/11	26	5	SP	Tan fine SAND		
	15/16						20
20	5/6	12	6	SP	Same		
	6/6						25
25	8/10	20	7	SP	Same		
	10/9						30
30	14/25	53	8	SP	Same, slight gray green tint		
	28/30				Boring completed at depth 30 feet		35
							40

APPROVED BY: 



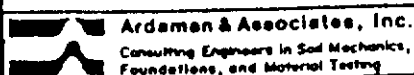
DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-12A

CHECKED BY V. Finizio SHEET 1 OF 1

NORTHING <u>921605</u>	CLIENT <u>South Florida Water Management District</u>
EASTING <u>454742</u>	PROJECT <u>Nicodemus Slough (85-3369)</u>
DATE DRILLED <u>5-22-85</u>	<u>Glades County, Florida</u>
GROUND SURFACE ELEV <u>19.11</u>	DRILL CREW <u>D. Groover, K. Secrist</u>
WATER TABLE DEPTH <u>5'0"</u> DATE <u>5-22-85</u>	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/4	9	1	SP	Brown fine SAND with traces of silt and root systems		
	5/6						
	3/4	11	2				
5	7/8			SP	Tan fine SAND		5
10	5/5	11	3	SP	Light brown fine SAND		10
	6/7						
15	5/6	17	4	SM	Brown slightly silty fine SAND with some slightly clayey fine sand		15
	11/10						
20	6/6	17	5	SP	Tan fine SAND		20
	11/12						
25	2/0	1	6	SP	Gray fine SAND with traces of silt		25
	0/1						
30	8/11	25	7	SP	Same		30
	14/14						
					Boring completed at depth 30 feet		
35							35
40							40


APPROVED BY:

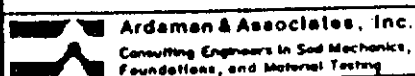


DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-13A
 CHECKED BY V. Tinigio SHEET 1 OF 1

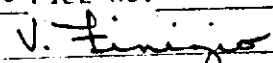
NORTHING 920605	CLIENT South Florida Water Management District
EASTING 454740	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-22-85	Glades County, Florida
GROUND SURFACE ELEV 19.32	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 5'0" DATE 5-22-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	2/4 5/6 6/7 8/9	9	1	SP	Brown fine SAND with surface organics		5
		15	2	SP	Light tan fine SAND		
10	5/5 4/6	9	3	SP	Light gray fine SAND with some silt		10
15	5/7 7/7	14	4	SP	Tan fine SAND		15
20	6/4 2/1	6	5	SP	Same		20
25	3/3 3/7	6	6	SP	Tan fine SAND with cemented sand and shell fragments		25
30	10/11 11/12	22	7	SP	Light brown fine SAND		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: 



DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-14A

CHECKED BY  SHEET 1 OF 1

NORTHING <u>918605</u>	CLIENT <u>South Florida Water Management District</u>
EASTING <u>454732</u>	PROJECT <u>Nicodemus Slough (85-3369)</u>
DATE DRILLED <u>5-22-85</u>	<u>Glades County, Florida</u>
GROUND SURFACE ELEV <u>18.63</u>	DRILL CREW <u>D. Groover, K. Secrist</u>
WATER TABLE DEPTH <u>5'0"</u> DATE <u>5-22-85</u>	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	3/4	9	1	SP	Light brown fine SAND		
	5/5		2	SP	Tan fine SAND		
	4/6	12	3	SP	Orange brown clayey fine SAND		5
5	6/8			SC			
	4/7	17	4	SP	Light gray fine SAND/some fine shell fragments		10
10	10/8						
	3/2	4	5	SP	Gray slightly silty fine SAND with shell fragments		15
15	2/2						
	2/3	7	6	SP	Same, with some cemented sand fragments		20
20	4/4						
	2/3	7	7	SP	Gray fine SAND with traces of silt and shell fragments		25
25	4/3						
	4/3	5	8	SP	Gr. SHELLS and v. fine SAND w/some silt		30
30	2/2				Boring completed at depth 30 feet		
							35
35							
							40
40							

APPROVED BY: RLC

DATE 5-31-85 FILE NO. 85-2775 BORING NO. CB-16A

CHECKED BY V. Finizio SHEET 1 OF 1

NORTHING 919607
EASTING 454694
DATE DRILLED 5-21-85

GROUND SURFACE ELEV 21.74

WATER TABLE DEPTH 10'0" DATE 5-21-85

CLIENT South Florida Water Management District

PROJECT Nicodemus Slough (85-3369)

Glades County, Florida

DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	6/10 8/6 7/8 7/6	18 15	1 2	SP SP	Brown fine SAND with rock and surface organics Brown fine SAND with traces of silt		5
10	10/12 12/12	24	3	SP SM	Tan slightly silty calcareous fine SAND and cemented sand fragments		10
15	3/2 1/2	3	4	SP	Light gray slightly silty, very fine SAND with traces of shell fragments		15
20	5/3 6/6	9	5	SP	Same, more shells		20
25	5/6 7/6	13	6	SP	Gray fine SAND and shell fragments		25
30	5/5 6/5	11	7	SP	Brown fine SAND		30
35	2/1 2/2	3	8	SP	Gray medium to fine SAND and fine shell fragments		35
40			9	ML	Green clayey SILT with shell fragments		40
					Boring completed at depth 40 feet		

APPROVED BY:

R. L. R.

DATE 5-31-85 FILE NO. 85-2775 BORING NO. CB-17A

CHECKED BY *V. Finizio* SHEET 1 OF 1



Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics,
Foundations, and Material Testing

NORTHING <u>919636</u>	CLIENT <u>South Florida Water Management District</u>
EASTING <u>454630</u>	PROJECT <u>Nicodemus Slough (85-3369)</u>
DATE DRILLED <u>5-22-85</u>	<u>Glades County, Florida</u>
GROUND SURFACE ELEV <u>20.23</u>	DRILL CREW <u>D. Groover, K. Secrist</u>
WATER TABLE DEPTH <u>10'0"</u> DATE <u>5-22-85</u>	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	4/5	9	1	SP	Brown fine SAND with traces of tan calcareous silty fine sand nodules		
	4/6		2				
	3/3	7					
5	4/3			SP	Same		5
10	5/4	11	3	SP	Tan calcareous slightly silty fine SAND with cemented sand fragments		10
	7/6						
15	2/4	7	4	SM	Tan calcareous silty fine SAND with medium to coarse shell fragments		15
	3/3						
20	6/7	17	5	SP	Grayish tan fine SAND with some fine shell fragments		20
	10/10						
25	6/5	10	6	SP	Tan to gray SAND and SHELLS with traces of silt		25
	5/5						
30	7/8	19	7	SP	Same		30
	11/9						
35	3/2	4	8	ML	Gray SILT with traces of shell fragments		35
	2/2						
	1/0		9	ML	Same		40
	0/1	1					
40					Boring completed at depth 40 feet		

APPROVED BY: *RR*

DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-18A

CHECKED BY V. Tiniz SHEET 1 OF 1

NORTHING 915699	CLIENT South Florida Water Management District
EASTING 454652	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-21-85	Glades County, Florida
GROUND SURFACE ELEV 18.49	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 5'0" DATE 5-21-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/3	9	1	SP	Brown fine SAND with small roots, shell fragments and gravel size rock		
	6/7		2	SP			
	6/7	16			Light brown fine SAND		5
5	9/11		3				
				SP SM	Dark reddish brown to black, slightly silty, organic stained fine SAND		
10	5/4	10	4				10
	6/5			SP	Very light brown fine SAND		
15	5/7	13	5				15
	6/8			SP SM	Light yellowish gray slightly silty fine SAND and shell fragments		
20	7/9	25	6				20
	16/16			SP SM	Light gray slightly silty fine SAND with shell fragments		
25	12/16	40	7				25
	24/19			SP	Light gray fine SAND with traces of shell fragments		
30	/17	39	8				30
	16/23			SP	Light gray fine SAND with fine shell fragments		
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *[Signature]*

DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-19A

CHECKED BY *[Signature]* SHEET 1 OF 1

NORTHING 914209	CLIENT South Florida Water Management District
EASTING 454640	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-21-85	Glades County, Florida
GROUND SURFACE ELEV 17.76	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 5'0" DATE 5-21-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	3/3	7	1	SP	Light brown fine SAND		
	4/7		2	SP	Dk. brn. slightly clayey fine SAND		
	14/34	63	3				5
	29/11			SP	Light tanish brown, calcareous, consolidated cemented SAND and SHELL		
5							
	10/7	13	4	SP SM	Light tanish gray silty, calcareous fine SAND with shell fragments and cemented sand and shell		10
10							
	6/8	17	5	SP SM	Brownish gray slightly silty fine SAND with shell fragments		15
15							
	8/12	25	6	SP	Brownish gray fine SAND		20
20							
	12/18	35	7	SP	Light brown fine SAND		25
25							
	17/12						
	7/8	15	8	SP SM	Gray slightly silty fine SAND with traces of fine shell fragments		30
30					Boring completed at depth 30 feet		
	7/8						35
35							
							40
40							

APPROVED BY: *[Signature]*

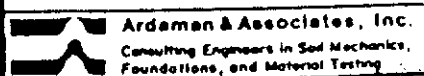
DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-20A

CHECKED BY *[Signature]* SHEET 1 OF 1

NORTHING 912209	CLIENT South Florida Water Management District
EASTING 454635	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-21-85	Glades County, Florida
GROUND SURFACE ELEV 18.03	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 5'0" DATE 5-21-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	2/3 5/5 5/6 8/8	8 14	1 2 3	SP SP SP SM	Grayish brown fine SAND Light brown fine SAND Dark reddish brown to black, slightly silty, organic stained fine SAND		5
10	6/7 7/6	14	4	SP SM	Light blue/gray slightly silty fine SAND and shell fragments		10
15	5/6 6/7	12	5	SP	Gray SHELL fragments with slightly silty to silty fine sand		15
20	5/6 10/6	16	6	SP SM	Brown fine SAND with traces of fine shell fragments		20
25	5/8 10/9	18	7	SP SM	Brownish gray slightly silty fine SAND with traces of fine shell fragments		25
30	12/12 13/10	25	8	SP SM	Brownish gray slightly silty fine SAND		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *[Signature]*




DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-21A

CHECKED BY *V. Jimenez* SHEET 1 OF 1

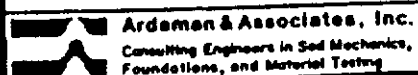
NORTHING <u>910710</u>	CLIENT <u>South Florida Water Management District</u>
EASTING <u>454622</u>	PROJECT <u>Nicodemus Slough (85-3369)</u>
DATE DRILLED <u>5-21-85</u>	<u>Glades County, Florida</u>
GROUND SURFACE ELEV <u>17.61</u>	DRILL CREW <u>D. Groover, K. Secrist</u>
WATER TABLE DEPTH <u>5'0"</u> DATE <u>5-21-85</u>	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	1 1/2 3/3 3/6 11/8	5 17	1 2 3	SP SP SP SM	Dark brown fine SAND with traces of silt Tan fine SAND Dark brown slightly silty fine SAND with organic staining (pan)		5
10	6/7 7/7	14	4	SP SM	Gray slightly silty fine SAND with traces of slightly clayey fine sand		10
15	2/2 2/2	4	5	SP	Dark gray silty fine SAND with traces of silt		15
20	1/1 1/2	2	6	SP	Same, fine to medium shell fragments Harder		20
25	11/19 24/31	43	7	SP	Gray medium to fine SAND		25
30	7/8 9/9	17	8	SP	Dark gray fine SAND with fine shell fragments		30
35					Boring completed at depth 30 feet		35
40							40

APPROVED BY: 

DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-22A

CHECKED BY V. Pinizio SHEET 1 OF 1



NORTHING 908703
 EASTING 454602
 DATE DRILLED 5-17-85
 GROUND SURFACE ELEV 18.90
 WATER TABLE DEPTH DATE

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW P. Vick, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
4/10	10/14	20	1	SP	Brown slightly silty fine SAND, some soft limeroack		
10/10	13/16	23	2	SP	Light brown fine SAND		5
19/39	50/41	89	3	SM	Light blue/gray silty fine SAND, with cemented sand and shell fragments		10
5/3	3/4	6	4	SM ML	Gray SILT & very fine SAND, with shell fragments		15
3/2	3/5	5	5		Same, less shell		20
2/2	2/2	4	6	SM	Light gray fine to coarse shell fragments with silt and very fine sand		25
7/2	1/2	3	7	ML	Gray SILT, slightly clayey, traces of sand and shell fragments		30
7/2	4/4	6	8	SM	Brownish gray silty fine SAND with shell fragments		35
4/7	5/6	12	9				40

APPROVED BY: *[Signature]*


DATE 5-22-85 FILE NO. 85-2775 BORING NO. CB-23A


CHECKED BY *[Signature]* SHEET 1 OF 2

NORTHING 908703
 EASTING 454602
 DATE DRILLED 5-17-85
 GROUND SURFACE ELEV 18.90
 WATER TABLE DEPTH ---- DATE

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW Vick, Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	5/6		9	SW SM	Gray slightly silty fine to medium shell fragments and fine sand		
45	9/15 8/14	23	10	SP SM	Same, finer		45
50	7/6 7/5	13	11	ML	Gray SILT with embedded small decomposed shell fragments		50
55	4/6 5/7	11	12		Same, less shell		55
60	3/5 3/5	8	13		Same, more shell		60
65	4/6 7/6	13	14		Grading slightly sandy		65
70	6/5 5/5	10	15		Same		70
75	1/4 6/7	10	16		Same		75
					Boring completed at depth 75 feet		
80							80

APPROVED BY: 

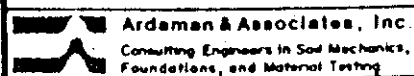
DATE 5-22-85 FILE NO. 85-2775 BORING NO. CB-23A
 CHECKED BY  SHEET 2 OF 2

NORTHING 908701	CLIENT South Florida Water Management District
EASTING 454500	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-17-85	Glades County, Florida
GROUND SURFACE ELEV 19.15	DRILL CREW Vick, Secrist
WATER TABLE DEPTH ---- DATE	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
2/3	9	1	SP	Brown slightly silty fine SAND, trace of soft limerock			
6/8	8	2	SM	Same, trace of organic fines			5
3/4							
4/4							
5							
10	50/4"		NR	Hard Drilling			10
			3				
			ML	Med gray SILT and f. SAND, with fine to medium shell fragments			
15	3/5	11	4	Same, fewer shell fragments			15
	6/4						
20	2/3	5	5	SM	Lighter gray fine to coarse SHELL fragments with silty fine sand		20
	2/3						
25	1/1	2	6	SM	Brownish gray clayey silty SAND, with shell fragments		25
	1/1			SC			
30	1/12"	1	7	Same			30
	1/1						
35	1/1	2	8	Same			35
	1/1						
40	1/1	3	9	Same			40
	2/2						
					Boring completed at depth 40 feet		

APPROVED BY: *DR*

DATE 5-22-85 FILE NO. 85-2775 BORING NO. CB-24A




CHECKED BY *W Bailey*

SHEET 1 OF 1

NORTHING 908536
 EASTING 454596
 DATE DRILLED 5-16-85
 GROUND SURFACE ELEV 18.94
 WATER TABLE DEPTH DATE 5-16-85

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW P. Vick, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	2/2 2/2 3/2 3/5	4 5	1 2 3	SP SM PT	Light brown slightly silty fine SAND PEAT, decomposed, mostly silt, few fibers, sandy Light brown slightly silty fine SAND.		5
10	2/3 3/2	6	4	SP SM	Grayish brown slightly silty fine SAND with trace of clay and shell fragments		10
15	10/8 8/8	16	5	SM	Gray silty very fine SAND with small shell fragments		15
20	2/3 3/4	6	6	SM	Green silty very fine SAND		20
25	4/3 4/3	7	7	SM	Gray silty calcareous fine to coarse, SAND and shell fragments, some cemented fragments		25
30	1/1 0/2	1	8	ML	Green clayey SILT with shell		30
35	1/0 0/7	1	9				35
40	5/2 5/6	7	10	SP SM	Grayish brown slightly silty fine to medium SAND with trace of shell fragments		40

APPROVED BY: 

DATE 5-24-85 FILE NO. 85-2775 BORING NO. CB-25A
 CHECKED BY V. Tinizog SHEET 1 OF 2

NORTHING 908536
EASTING 454596

DATE DRILLED 5-16-85

GROUND SURFACE ELEV 18.94

WATER TABLE DEPTH DATE 5-16-85

CLIENT South Florida Water Management District

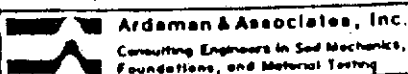
PROJECT Nicodemus Slough (85-3369)

Glades County, Florida

DRILL CREW P. Vick, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	5/6		10		Same, more shell		
45	10/14 18/34	32	11	SP SM	Gray slightly silty fine SAND, trace of medium sand, no shell		45
50	7/9 8/8	17	12		Same		50
55	5/10 10/15	20	13	ML	Gray SILT and shell		55
60	5/6 7/15	13	14		Same, grading less shell		60
65	8/9 9/7	18	15		Same		65
70	5/5 6/8	11	16		Same		70
75	1/7 9/9	16	17		Same		75
					Boring completed at depth 75 feet		80

APPROVED BY: 




DATE 5-24-85 FILE NO. 85-2775 BORING NO. CB-25A

CHECKED BY V. Tiniz SHEET 2 OF 2

NORTHING 908536
 EASTING 454496
 DATE DRILLED 5-21-85
 GROUND SURFACE ELEV 20.00
 WATER TABLE DEPTH DATE 5-21-85

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW D.Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	3/8	15	1	SP	Brown fine SAND with cemented sand fragments		
	7/6		2				
	3/2	5					
	3/3			SP	Tan fine SAND with traces of dark brown silty fine sand (pan)		5
5							
10	7/8	14	3	SP	Light brown slightly silty fine SAND with cemented sand fragments		10
	6/5						
15	7/6	11	4	SP	Light gray fine SAND with traces of silt and fine shell fragments		15
	5/7						
20	6/6	11	5		Spoon blocked with cemented SAND		20
	5/6						
25	3/9	17	6	SP	Dark gray slightly silty fine SAND with cemented sand fragments		25
	8/7						
30	1/0	1	7	ML	Gray SILT with some fine sand and decomposing shell fragments		30
	0/0						
35	1/0	1	8		Same		35
	0/0						
40	7/8	17		SP	Dark gray fine SAND with fine shell fragments and traces of silt		40
	9/10				Boring completed at depth 40 feet		

APPROVED BY: 

DATE 5-28-85 FILE NO. 85-2775 BORING NO. CB-26A
 CHECKED BY V. Tinjio SHEET 1 OF 1

NORTHING 906940	CLIENT South Florida Water Management District
EASTING 454567	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-16-85	Glades County, Florida
GROUND SURFACE ELEV 15.13	DRILL CREW P. Vick, K. Secrist
WATER TABLE DEPTH 3'2" DATE 5-16-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	1/3 6/6 6/3 4/6 4/3 4/4 5/5 6/5 4/7 6/5	9 7 7 11 13	1 2 3 4 5	SP SM	Light brown slightly silty fine SAND Same, grading darker Same, grading lighter		5
10				SP	Light brown fine SAND with shell fragments Same, more & coarser shell		10
15	14/19 9/8	28	6	SM	Light grayish brown silty calcareous SAND and shell, some cemented fragments		15
20	6/7 7/7	14	7	SM	Gray silty very fine SAND with trace of small shell fragments		20
25	9/8 15/14	23	8	SP SM	Gray slightly silty fine SAND with trace of small shell fragments		25
30	/12 7/10	19	9	SP SM	Grayish brown slightly silty fine to medium SAND with shell fragments		30
					Boring completed at depth 30 feet		


APPROVED BY: 

DATE 5-24-85 FILE NO. 85-2775 BORING NO. CB-27A
CHECKED BY V. Finizio SHEET 1 OF 1

NORTHING 904940
EASTING 454557
DATE DRILLED 5-16-85
GROUND SURFACE ELEV 14.57
WATER TABLE DEPTH DATE

CLIENT South Florida Water Management District
PROJECT Nicodemus Slough (85-3369)
Glades County, Florida
DRILL CREW P. Vick, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	1/2 3/4 3/3 3/4 3/4 3/3 3/4 6/4 3/5 3/3	5 6 7 10 8	1 2 3 4 5	SP SP SP SM	Light brown fine SAND Same Brown silty, slightly clayey fine SAND Same		5 10
15	50/3"				Very hard layer encountered (no recovery)		15
20					Boring completed at depth 15 feet		20
25							25
30							30
35							35
40							40

APPROVED BY: 

DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-28A
CHECKED BY V. Tinizio SHEET 1 OF 1

NORTHING	902940	CLIENT	South Florida Water Management District
EASTING	454546	PROJECT	Nicodemus Slough (85-3369)
DATE DRILLED	5-16-85		Glades County, Florida
GROUND SURFACE ELEV	14.07	DRILL CREW	P. Vick, K. Secrist
WATER TABLE DEPTH 2'5"	DATE 5-16-85		

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
1/2		5	1	SP	Light brown fine SAND		
3/5			2		Same		
3/4		9	3		Same		
5/4			4		Same		
5		5	5		Same		5
6/3		5	6		Same		
2/2		5	7		Same		
2/3		9	8		Same		
2/2			9		Same		
3/4			10		Same		10
5/5			11		Same		
			12		Same		
			13		Same		
			14		Same		
			15		Same		15
			16		Same		
			17		Same		
			18		Same		
			19		Same		
			20		Same		20
			21		Same		
			22		Same		
			23		Same		
			24		Same		
			25		Same		25
			26		Same		
			27		Same		
			28		Same		
			29		Same		
			30		Same		30
			31		Same		
			32		Same		
			33		Same		
			34		Same		
			35		Same		35
			36		Same		
			37		Same		
			38		Same		
			39		Same		
			40		Same		40

APPROVED BY: *[Signature]*

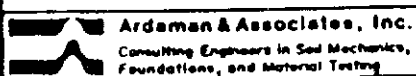
DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-29A

CHECKED BY *V. Finija* SHEET 1 OF 1

NORTHING 901440	CLIENT South Florida Water Management District
EASTING 454538	
DATE DRILLED 5-16-85	PROJECT Nicodemus Slough (85-3369)
GROUND SURFACE ELEV 13.64	Glades County, Florida
WATER TABLE DEPTH 2'6" DATE 5-16-85	DRILL CREW P. Vick, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	1/2	5	1	SP	Dark gray to black slightly silty organic fine SAND		
	3/4		2				
	7/7	15	3	SP	Light brownish gray fine SAND		
	8/5				Same		
5	3/4	8	4	SP	Light brownish gray slightly silty fine SAND		5
	4/4	8	5	SM	Same		
	4/4						
10	7/6	11	6	SP	Light brownish gray slightly silty fine SAND and shell fragments		10
	5/6			SM			
15	16/50	74	7	SP	Gray clayey fine SAND and cemented sand and shell with shell fragments		15
	24/21			SC			
20	10/6	16	8	SP	Gray silty fine SAND and shell fragments		20
	10/9			SM			
25	23/16	33	9	SP	Gray cemented SAND and shell with silty fine sand and shell fragments		25
	17/10			SM			
30	/6	14	10	SP	Gray slightly silty to silty fine SAND and shell fragments		30
	8/8			SM			
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: 



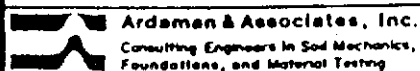
DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-30A
 CHECKED BY V. Liniger SHEET 1 OF 1

NORTHING 899885
 EASTING 454526
 DATE DRILLED 5-15-85
 GROUND SURFACE ELEV 19.85
 WATER TABLE DEPTH 7'6" DATE 5-15-85

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW P. Vick, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	1/2	4	1	SP	Tan fine SAND and shell with cemented sand and shell fragments		
	2/3						
	4/6	12	2				5
	6/4						
5	3/2	4	3	SP	Brown slightly silty fine SAND with shell fragments and gravel size rock		
	2/2	4	4				
	3/2	4					
	2/2						
10	2/2	3	5		Same, no rock		10
	1/2						
15	5/6	11	6	SP	Tan fine to medium SHELL fragments and tan fine SAND with traces of silt		15
	5/5						
				SM	Gray silty very fine SAND with traces of shell fragments		
20	3/2	5	7				20
	3/3						
25	6/5	9	8	SP	Gray cemented fine SAND and SHELL with gray slightly silty fine sand		25
	4/3						
30	4/3	7	9		Same		30
	4/4						
					Boring completed at depth 31 feet		
35							35
40							40

APPROVED BY: *[Signature]*



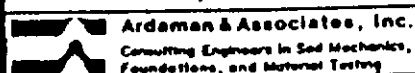
DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-31A
 CHECKED BY *[Signature]* SHEET 1 OF 1

NORTHING 899891
 EASTING 454433
 DATE DRILLED 5-20-85
 GROUND SURFACE ELEV 19.17
 WATER TABLE DEPTH 10'0" DATE 5-20-85

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
Glades County, Florida
 DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	2/3 8/6 6/5 5/6	11 10	1 2	SP	Brown fine SAND with shell fragments and traces of cemented sand fragments silt		5
				SP	Same		
10	0/0 0/0	WOH	3	SM	Dark gray silty fine SAND with shell		10
15	3/4 2/2	6	4	SP	Gray to tan fine SAND with shell fragments		15
				ML	Gray SILT and SAND		
20	4/4 3/3	7	5 6	SM	Gray silty fine SAND and SHELL		20
				SP	Dark gray cemented SAND and SHELL		
25	2/2 2/3	4	7		Boring completed at depth 26 feet		25
30							30
35							35
40							40

APPROVED BY: RLC



DATE 5-31-85 FILE NO. 85-2775 BORING NO. CB-32A
 CHECKED BY V. [Signature] SHEET 1 OF 1

NORTHING 897467

EASTING 454494

DATE DRILLED 5/15/85

GROUND SURFACE ELEV 13.85

WATER TABLE DEPTH 3'9" DATE 5/15/85

CLIENT South Florida Water Management District

PROJECT Nicodemus Slough (85-3369)

Glades County, Florida

DRILL CREW P. Vick, k. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/2	5	1	SP	Lt. brn fine SAND w/pockets of dk. brn. organic silt, traces of shell frag. & roots		
	3/3	5	2	ML	Brown SILT with sand, shell fragments and traces of fibrous organics.		
	3/2	5	3		Same, interbedded gr. clayey f. sand		5
5	2/3	5	4	OL	Dark brown organic SILT		
	2/4	1	5	SP	Tan fine SAND w/some organic silt (OL)		
	2/0	4	6	ML	Gray SILT w/ traces of very fine sand and fine shell fragments		10
10	1/1		7	SM	Brown slightly silty, slightly clayey fine SAND		
	0/1						
	3/4						
15	4/2	4	8	SM	Tan calcareous silty fine SAND and traces of shell fragments		15
	2/2						
20	7/14	26	9	SM	Same, with cemented sand and shell fragments		20
	12/9						
25	7/6	9	10	SM	Tan calcareous silty fine SAND and shell fragments		25
	3/5						
30	7/8	15	11	SM	Same, fewer shell fragments		30
	7/7						
35					Boring completed at depth 30 feet		35
40							40

APPROVED BY: *RLC*

DATE 5/31/85 FILE NO. 85-2775 BORING NO. CB-33A


CHECKED BY *V. Finizio* SHEET 1 OF 1

Ardaman & Associates, Inc.
Consulting Engineers in Soil Mechanics,
Foundations, and Material Testing

NORTHING 895352
 EASTING 454485
 DATE DRILLED 5-15-85
 GROUND SURFACE ELEV 13.78
 WATER TABLE DEPTH 3'6" DATE 5-15-85

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW P. Vick, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
5	1/5 4/3 6/2 3/3 3/1 1/1 1/1 3/7 3/12 16/20	9 5 2 4 28	1 2 3 4 5 6	SP SM SP SM	Grayish brown slightly silty fine SAND with shell Gray slightly silty fine SAND with shell fragments and seams of black silt (SM) Gray slightly silty fine SAND and SHELL fragments		5 10
15	4/7 14/ 50/4" 25/1"	21	7	SP SM	Gray cemented SAND and SHELL with silty fine sand and shell fragments Very hard layer encountered- no recovery		15
20					Boring completed at depth 16.5 feet		20
25							25
30							30
35							35
40							40

APPROVED BY: 

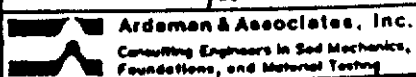
DATE 5-29-85 FILE NO. 85-2775 BORING NO. CB-34A
 CHECKED BY V. Finizio SHEET 1 OF 1

NORTHING	941000	CLIENT <u>South Florida Water Management District</u>
EASTING	459902	
DATE DRILLED	5-30-85	
GROUND SURFACE ELEV	17.22	
PROJECT	Nicodemus Slough (85-3369)	
WATER TABLE DEPTH 6'0" DATE 5-30-85		Glades County, Florida
		DRILL CREW <u>D. Groover, K. Secrist</u>

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/4 2/2	6	1	SP	Tan to gray fine SAND with traces of fine shell fragments		
5	5/3 3/1	6	2	SP	Same, more shell fragments		5
10	4/4 4/4	8	3	ML	Light gray SILT with traces of shell fragments and very fine sand		10
15	3/2 2/3	4	4	SM	Greenish gray SAND and SILT with shell fragments		15
20	2/3 3/4	6	5	SM	Same, cemented sand fragments		20
25	2/3 4/4	7	6	SM	Same, no shell or cemented sand fragments		25
30	3/4 4/4	8	7	SM	Same		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY:

Robert C. R.



DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-1B
 CHECKED BY V. L. L. SHEET 1 OF 1

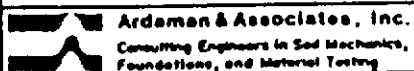
NORTHING	940389	CLIENT	South Florida Water Management District
EASTING	459899	PROJECT	Nicodemus Slough (85-3369)
DATE DRILLED	5-29-85		Glades County, Florida
GROUND SURFACE ELEV		DRILL CREW	D. Groover, K. Secrist
WATER TABLE DEPTH	6'0"	DATE	5-29-85

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	3/4 5/5	9	1	SP	Tan to brown fine SAND with traces of silt		
5	1/1 0/1	1	2	ML	Gray silt with traces of very fine SAND		5
10	4/5 7/6	12	3	SP	Gray fine SAND with traces of cemented sand fragments and silt		10
15	2/2 2/2	4	4	SM	Greenish gray SAND and SILT with traces of shell fragments		15
20	3/3 3/3	6	5	SM	Same, more shell fragments		20
25	2/3 4/4	7	6	SM	Same, less shells		25
30	2/3 2/3	5	7	SM	Same		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: Robert E. B.

DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-2B

CHECKED BY V. F. SHEET 1 OF 1



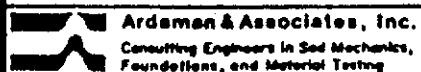
NORTHING 939389
 EASTING 459891
 DATE DRILLED 5-28-85
 GROUND SURFACE ELEV Existing
 WATER TABLE DEPTH 3'5" DATE 5-28-85

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/2 2/2	4	1	SP	Brown fine SAND with surface organics		
5	5/8 5/6	13	2	SP	Tan SHELLS and light brown fine SAND with traces of silt		5
10	1/3 2/2	5	3	SM	Gray silty calcareous fine to coarse SAND and shell fragments		10
15	2/3 3/3	6	4	SP SM	Gray very fine SAND and some silt		15
20	3/3 3/3	6	5	ML	Gray SILT with shell fragments and some very fine sand		20
25	2/3 4/4	7	6	SM	Gray fine SAND and SILT with traces of shell fragments		25
30	1/3 3/4	6	7	SM	Same, more shell		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *RLG*

DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-3B
 CHECKED BY *J. Linig* SHEET 1 OF 1



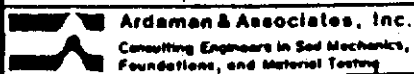
NORTHING 937889
 EASTING 459882
 DATE DRILLED 5-28-85
 GROUND SURFACE ELEV Existing
 WATER TABLE DEPTH 3'5" DATE 5-28-85

CLIENT South Florida Water Management District
 PROJECT Nicodemus Slough (85-3369)
 Glades County, Florida
 DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/3	6	1	SP	Dark brown fine SAND with surface org.		
	3/3		2	SP	Light brown fine SAND		
5	11/13	32	3	SP	Light tan fine SAND and SHELLS		5
	19/20						
10	3/2	5	4	SM	Gray very fine SAND and SILT with traces of shell fragments		10
	3/3						
15	2/2	7	5	SM	Same, more shells		15
	5/5		6		Brown CORAL		
20	3/4	8	7	SM	Gray silty calcareous fine to coarse SAND and shell fragments		20
	4/5						
25	2/3	7	8	SP SM	Dark gray SAND and SILT with some shell fragments		25
	4/4						
30	3/4	9	9	SM	Same, more shell		30
	5/3				Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *RLBCR*

DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-4B



CHECKED BY *V. L. L. L.* SHEET 1 OF 1

WATER TABLE DEPTH 3'5" DATE 5-28-85

DRILL CREW D. Groover, K. Secrist

APPROVED BY:

CHECKED BY V. Finizio SHEET 1 OF 1

NORTHING	932791	CLIENT	South Florida Water Management District
EASTING	459849	PROJECT	Nicodemus Slough (85-3369)
DATE DRILLED	5-24-85		Glades County, Florida
GROUND SURFACE ELEV	19.14	DRILL CREW	D. Groover, K. Secrist
WATER TABLE DEPTH	4'5"	DATE	5-24-85

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/2 4/3	6	1	SM	Brown slightly silty, slightly clayey fine SAND with traces of shell fragments and gravel size rock		
5	1/2 4/4	6	2	SP	Brown to orange slightly silty, slightly clayey fine SAND		5
10	4/5 3/3	8	3	SP SM	Light gray slightly silty, calcareous fine SAND with fine shell fragments		10
15	2/2 2/2	4	4	SP SM	Light gray very fine SAND, some silt		15
20	2/3 3/4	6	5	SP SM	Same, more silt		20
25			6	SM	Dark gray very fine SAND and SILT		25
			7	SP SM	Gray slightly silty fine SAND and fine SHELL fragments		30
30					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: R. L. C. R.

DATE 5-31-85 FILE NO. 85-2775 BORING NO. CB-68
 CHECKED BY V. L. L. L. SHEET 1 OF 1

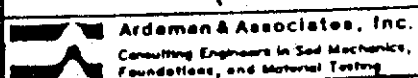
NORTHING 931077
EASTING 459837
DATE DRILLED 5-29-85

GROUND SURFACE ELEV 18.25
WATER TABLE DEPTH 5'0" DATE 5-29-85

CLIENT South Florida Water Management District
PROJECT Nicodemus Slough (85-3369)
Glades County, Florida
DRILL CREW D. Groover, K. Secrist

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/3 3/4	6	1	SP	Dark gray slightly silty fine SAND with fine shell fragments		
5	5/3 6/5	9	2	SM	Medium brown slightly silty, slightly clayey fine SAND		5
10	6/5 5/8	10	3	SP	Tan fine SAND		10
15	2/2 3/3	5	4	SP SM	Gray SAND and SILT with shell fragments		15
20	2/2 3/2	5	5	SP SM	Same, less shells		20
25	2/3 4/4	7	6	SP SM	Same		25
30	2/3 3/3	6	7	SP SM	Same, more shell fragments		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *[Signature]*



DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-7B
CHECKED BY *[Signature]* SHEET 1 OF 1

NORTHING 928675	CLIENT South Florida Water Management District
EASTING 459822	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-29-85	Glades County, Florida
GROUND SURFACE ELEV 15.99	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 5.0" DATE 5-29-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/10 7/5	17	1	SP	Brown fine SAND with cemented sand fragments		
5	4/4 2/2	6	2	SP	Tan fine SAND		5
10	4/5 4/4	9	3	ML	Gray SILT with some fine sand and cemented sand fragments		10
15	3/4 5/2	9	4	ML	Same, shell fragments and more sand		15
20	3/4 4/4	8	5	ML	Same, less shell fragments		20
25	2/3 1/3	4	6	SM	Gray SAND and SILT		25
30	2/3 4/4	7	7	SM	Same		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *RLC. R.*

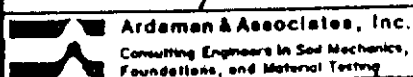
DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-8B

CHECKED BY *V. Fungio* SHEET 1 OF 1

NORTHING 927266	CLIENT South Florida Water Management District
EASTING 459905	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-29-85	Glades County, Florida
GROUND SURFACE ELEV 17.26	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 4'5" DATE 5-29-95	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	3/3 4/4	7	1	SM	Gray to brown (mottled) slightly silty, slightly clayey fine SAND with cemented sand and shell fragments, surface organics		
5	3/3 3/3	6	2	ML	Tan calcareous SILT and some very fine sand with cemented sand fragments		5
10	2/1 2/2	3	3	SM	Gray SAND and SILT with fine shell fragments		10
15	4/4 2/3	6	4	SM	Same, cemented sand fragments		15
20	3/4 4/4	8	5	SM	Same, more shell fragments		20
25	2/3 4/4	7	6	SP	Greenish gray fine SAND with some silt		25
30	4/3 3/2	6	7	SP	Same		30
35	3/2 3/3	5	8	SP	Gray fine SAND and SILT with fine shell fragments		35
40	/29 50/5"		9	SP	Tan fine SAND		40
					Boring completed at depth of 40 feet		

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DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-9B

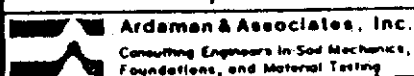
CHECKED BY *[Signature]* SHEET 1 OF 1

NORTHING 926654	CITINI South Florida Water Management District
EASTING 459838	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-29-85	Glades County, Florida
GROUND SURFACE ELEV 16.89	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 5'0" DATE 5-29-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/3	7	1	SP	Light brown slightly silty fine SAND		
	4/5		2		with cemented sand and shell fragments		
				SM	Dark brown silty fine SAND		
5	3/2	5	3	SM	Light tan to orange silty calcareous fine SAND with cemented sand fragments		5
	3/5						
10	2/1	2	4	SM	Gray very fine SAND and SILT		10
	1/2						
15	3/2	6	5	SM	Same, some shell fragments		15
	4/4						
20	3/2	6	6	SM	Same, more shell fragments		20
	4/4						
25	2/3	7	7	SM	Dark gray very fine SAND and SILT		25
	4/5						
30	3/3	7	8	SM	Same		30
	4/4						
35	2/2	5	9	SM	Same, some shell fragments		35
	3/4						
	50/5"		10	SP	Light tan to gray fine SAND		
40					Boring completed at depth 40 feet		40

APPROVED BY:

R. L. C. P.




DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-10B

CHECKED BY V. Timigio SHEET 1 OF 1

NORTHING	926778	CLIENT	South Florida Water Management District
EASTING	459916	PROJECT	Nicodemus Slough (85-3369)
DATE DRILLED	5-29-85		Glades County, Florida
GROUND SURFACE ELEV	17.28	DRILL CREW	D. Groover, K. Secrist
WATER TABLE DEPTH	5'0" DATE 5-29-85		

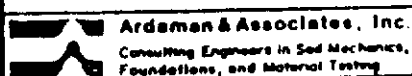
DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/3 5/6	8	1	SP	Brown fine SAND with surface organics		
			2	SP	Same, no organics		
5	11/8 7/7	15	3	SP	Tan fine SAND with medium shell fragments		5
10	10/10 11/14	21	4	SP	Light gray fine SAND with very fine shell fragments		10
15	11/12 13/13	25	5	SP	Same, some cemented sand fragments		15
20	3/4 4/4	8	6	SM	Gray fine SAND and SILT with traces of shell fragments		20
25	2/3 4/4	7	7	SM	Same, more shell fragments		25
30	3/2 3/4	5	8	SM	Same, fewer shell fragments		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: <i>[Signature]</i>	DATE <u>6-3-85</u> FILE NO. <u>85-2775</u> BORING NO. <u>CB-11B</u>
 Ardaman & Associates, Inc. Consulting Engineers in Soil Mechanics, Foundations, and Material Testing	CHECKED BY <i>[Signature]</i> SHEET <u>1</u> OF <u>1</u>

NORTHING 925909	CLIENT South Florida Water Management District
EASTING 459829	PROJECT Nicodemus Slough (85-3369)
DATE DRILLED 5-29-85	Glades County, Florida
GROUND SURFACE ELEV 17.60	DRILL CREW D. Groover, K. Secrist
WATER TABLE DEPTH 5'0" DATE 5-29-85	

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/4	8	1	SP	Dark brown fine SAND with surface org.		
	4/6		2	SP	Brown to dark brown fine SAND with traces of silt		
5	8/8	13	3	SP	Tan to orange fine SAND with cemented sand and shell fragments		5
10	8/8	17	4	SP	Light gray fine SAND with some cemented sand fragments		10
15	5/6	9	5	SM	Gray very fine SAND and SILT		15
20	3/4	8	6	SM	Same		20
25	2/3	5	7	SM	Same		25
30	2/2	6	8	SM	Same, more fine to medium sand		30
	4/5				Boring completed at depth of 30 feet		
35							35
40							40

APPROVED BY: *RLC*



DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-12B

CHECKED BY *J. L. King* SHEET 1 OF 1

NORTHING	924162	CLIENT	South Florida Water Management District
EASTING	459822	PROJECT	Nicodemus Slough (85-3369)
DATE DRILLED	5-29-85		Glades County, Florida
GROUND SURFACE ELEV	17.80	DRILL CREW	D. Groover, K. Secrist
WATER TABLE DEPTH	5'0"	DATE	5-29-85

DEPTH, FT	BLOWS PER SIX INCHES	SPT N-VALUE	SAMPLE NO.	USCS	SOIL DESCRIPTION	RECOVERY, %	DEPTH, FT
	2/3 4/4	7	1	SP	Brown slightly silty fine SAND with surface organics		
			2	SP	Tan fine SAND		
5	2/4 5/2	9	3	ML	Light brown SILT with interbedded calcareous deposits, very fine sand and traces of clay		5
10	8/8 8/7	16	4	SP	Light gray to tan fine to medium SAND with some cemented sand fragments		10
15	11/4 6/7	10	5	SP	Same, fine shell fragments		15
20	3/4 5/5	9	6	SM	Gray silty calcareous fine to coarse SAND and shell fragments		20
25	6/2 2/2	4	7	SM	Dark gray SILT and SAND with some shell fragments		25
30	3/3 4/3	7	8	SM	Same		30
					Boring completed at depth 30 feet		
35							35
40							40

APPROVED BY: *R. L. Secrist*

DATE 6-3-85 FILE NO. 85-2775 BORING NO. CB-13B

CHECKED BY *J. L. Secrist* SHEET 1 OF 1

Appendix 4

Correspondence on Indian Mounds



IN REPLY REFER TO:
6035/MP

South Florida Water Management District

John R. Wodraska, Executive Director
Tilford C. Creel, Deputy Executive Director

Post Office Box V 3301 Gun Club Road
West Palm Beach, Florida 33402
Telephone (305) 686-8800
Florida WATS Line 1-800-432-2045

April 29, 1986

Mr. Louis Tesar
Historic Preservation Supervisor
Division of Archives, History and
Records Management
Department of State
Tallahassee, FL 32301-8020

Dear Mr. Tesar:

Subject: Meeting on April 14 regarding Indian Mounds
in Nicodemus Slough

As you will recall, the purpose of the meeting which we had on April 14 was to discuss the potential impacts of this District's Nicodemus Slough Project on Indian mounds within the project area. After presentation of the project scope, ensuing discussion identified only two Indian mounds which could be affected by this project. Both Indian mounds (8G161 and 8G152) are located within the fee title acquisition area of Nicodemus Slough which may be subjected to periodic inundation from local runoff. However, it was determined that any inundation which would result from this project works would probably be infrequent and relatively minor, and would definitely not change the vegetative characteristics to upland species. If there were to be any vegetation changes on the Indian mounds, they would still continue to display wetland vegetation characteristics.

We understand that in your opinion, any impacts on Indian mounds 8G161 and 8G152 would be relatively minor, if at all, and would certainly be considerably less than the destruction currently taking place as a result of cattle access to the area. Therefore, and as you suggested, the South Florida Water Management District will provide continuous fencing along cattle grazing areas to restrict any and all cattle access into the retention area. In essence, repositioning the continuous fence line will also provide protection for Indian mounds 8G138 and 8G183. In addition, the District's Real Property Management Division will coordinate with your office development of a management plan for the area to incorporate your expressed concerns for limiting public access to the mounds.

Mr. Fred Schiller is the director of this division and has been notified of your concerns.

Stanley W. Hole
Chairman - Naples

William E. Sadowski
Vice Chairman - Miami

J. Neil Gallagher
St. Cloud

Nathaniel P. Reed
Hobe Sound

Kathleen Shea Abrams
Miami Shores

John F. Flanigan
North Palm Beach

Timor E. Powers
Indiantown

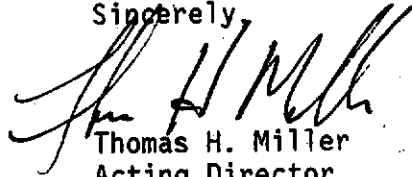
Nancy H. Roen
Plantation

Oscar M. Corbin, Jr.
Ft. Myers

Mr. Louis Tesar
April 29, 1986
Page 2

Again, we appreciate your assistance in this process. It would be helpful to us if your office would return a letter of concurrence with our discussion that we might provide it to the Department of Environmental Regulation as backup information for future environmental permitting.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Tom H. Miller', is written over the typed name.

Thomas H. Miller
Acting Director
Major Programs Division

THM/bh